June 2016 | WORLD HEALTH DESIGN

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ARCHITECTURE | CULTURE | TECHNOLOGY
JUNE 2017

SHAPING THE FUTURE OF MEDICINE

THE WILLIAM P. CLEMENTS JR. UNIVERSITY HOSPITAL

ACADEMY AWARDS 2015 REPORT

DESIGN AND HEALTH SCIENTIFIC REVIEWS

REPORT OF CASE STUDY PROJECTS

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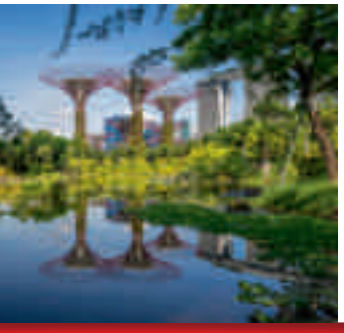
Volume 9 Issue 2

Design & Health
International Academy for Design and Health



FIRST ANNOUNCEMENT

CALL FOR PAPERS

To download the full Call for Papers visit www.designandhealth.com

Deadline for Abstracts
30 October 2016

Topic areas for presentations

- European healthcare design - critical review
- The salutogenic hospital: The role of hospitals in prevention and promotion
- Innovation in health infrastructure to revitalize health and tackle 21st century challenges
- Case studies of successful healthcare design from Europe and worldwide
- Built environments to enhance culture and health
- Salutogenic design for healthy communities and urban planning
- Innovative healthcare design to Improve maintenance
- Innovation in healthy workplaces in all sectors
- Promoting healthy lifestyles and active ageing through better environments

Vienna, Austria 12-16 July 2017

Design & Health

12TH WORLD CONGRESS & EXHIBITION

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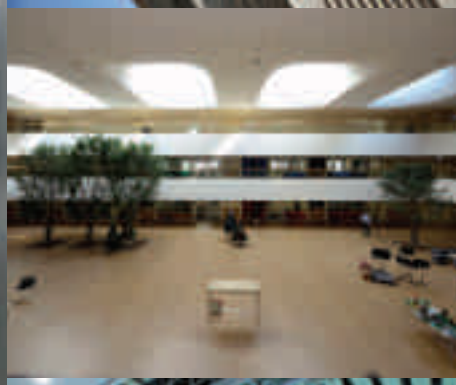

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The International Academy for Design and Health
P.O. Box 7196, 103 88 Stockholm, Sweden
Tel. +46 70 453 90 70
academy@designandhealth.com
www.designandhealth.com

BOARD OF EDITORIAL DIRECTORS
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International Academy for Design and Health, Sweden
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Tel. +46 70 453 90 70
dilani@designandhealth.com

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08
Call for WCDH2017

The International Academy for Design and Health (IADH) will be organizing the 12th Design & Health World Congress & Exhibition on 12-16th of July 2017 in partnership with the Austrian government, and with the collaboration of world-renowned academic institutions and healthcare industries. Download call for paper from;
www.designandhealth.com

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Call for submission

International Academy Awards comprises ten categories across the key areas of international health delivery, and the prestigious Lifetime Leadership Award. The final awards will be presented at a prestigious ceremony to be held on 15 July 2017 at the City Hall in Vienna, Austria during the 12th Design & Health World Congress & Exhibition. Download call for submission; *www.designandhealth.com*

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Design for Health

Health is not just a personal responsibility. The Ottawa Charter for Health Promotion states that “Health is created and lived by people within the settings of their everyday life; where they learn, work, play and love. Health is created by caring for oneself and others, by being able to take decisions and have control over one’s life circumstances.

By Prof. E.K. Yeoh

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Design Principales

The study investigated the main challenges that prevent nursing staff from taking restorative breaks in healthcare facilities. It also examined the main restorative components of staff break areas in healthcare facilities, by assessing usage patterns, verbal/ visual preferences, and perceived restorative.

By Dr. Adeleh Nejati

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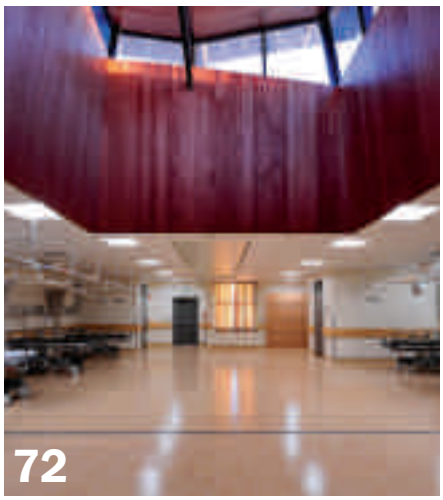
Future of Medicine

The William P. Clements Jr. University Hospital at UT Southwestern (UTSW) Medical Center is a new 1.3 million square-foot, high-profile academic hospital for UT Southwestern Medical Center, one of the country's leading academic medical centers and research institutions.

By CallisonRTKL



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Design Guidelines

The aim of this research is to assess the role of design guidelines for accident and emergency (A&E) facilities so as to make recommendations on how to improve their design and project development process. This study, therefore, focuses on design guidelines for accident and emergency facilities (DGAEF).

By Dr. Innocent Okpanum

EUROPEAN HEALTHCARE DESIGN

Revitalizing health using the salutogenic approach

The scientific programme for the 12th Design & Health World Congress & Exhibition in Vienna will explore the global application of salutogenic perspectives on European healthcare design

The International Academy for Design and Health (IADH) will be organizing the 12th Design & Health World Congress & Exhibition in partnership with the Austrian government, and with the collaboration of world-renowned academic institutions and healthcare industries.

The main principles of the Austrian healthcare system are solidarity, affordability and universality. Austria's healthcare system was ranked 9th by WHO, based on a social insurance model that guarantees all inhabitants equitable access to high quality health services regardless of their age, sex, origin, social status or income. The city of Vienna has been listed as first in the world in quality of living by the Mercer Quality of Living Survey.

After our first congress in 1997 in Trondheim, Norway, we have developed the concept of a healthy society using principles of salutogenic design. Trondheim Hospital has been demonstrated to be one of the leading health facilities and received seven International Academy Awards, including being named the best salutogenic hospital in the world at 10th Design & Health World Congress in Toronto. Since 1997 many projects have been presented at our congresses, and researchers and policy makers from across the world have investigated and developed scientific evidence of salutogenic design. Collectively, this effort represents a powerful scientific platform for researchers, policymakers and practitioners to implement salutogenic design worldwide.

During the last two decades IADH network members have been inspired by what they have seen and what they have learned, and have incorporated a salutogenic approach in their work and their lives. Our congress is unique in that we celebrate these achievements and critically review the role of salutogenic design in global healthcare design.

According to WHO, it is inevitable that the individual's lifestyle has an immense impact on health. Accordingly, health promotion is "the process of enabling people to increase control over and to improve their health" and the environment as a strategic, cost effective and enduring tool for improving public health.

Embracing the salutogenic perspective as a means of shaping our built environment to support healthy lifestyles is at the core of a preventative health strategy. Refocusing attention away from risk factors and the treatment of disease towards a more holistic understanding of the wellness factors that contribute to health lies at the heart of salutogenic design. By employing an interdisciplinary approach, architects, designers, landscape architects, engineers, public health scientists, psychologists and economists can help to achieve innovation and revitalizing European Healthcare Design. After two decades work of the IADH, we will continue to develop research, policy and practice of design and health and strengthen this approach in order to reduce the prevalence of lifestyle diseases.

The IADH wants to bring this understanding to the design and health professions in order to reduce the prevalence of lifestyle diseases and improve quality of life. We are delighted to invite you to submit scientific abstracts and case studies project by 30 October 2016 for WCDH 2017, to be held in the historic city of Vienna, Hofburg, from 12-16 July 2017.

Prof Alan Dilani PhD
Founder, International Academy for Design & Health, Stockholm- Sweden

Prof James Barlow PhD President, International Academy for Design & Health, Chair in Technology and Innovation Management, Imperial College, London, UK

The WCDH 2017 provides an opportunity to engage with the world's foremost interdisciplinary network of architects, designers, health planners, engineers, public health scientists, physicians, health administrators, psychologists, economists and other key decision-makers.

We are delighted to invite you to be part of this mission and vision by submitting the abstracts on the following themes:

- European healthcare design - critical review
- The salutogenic hospital: The role of hospitals in prevention and promotion
- Innovation in health infrastructure to revitalize health and tackle 21st century challenges
- Case studies of successful healthcare design from Europe and worldwide
- Built environments to enhance culture and health
- Salutogenic design for healthy communities and urban planning
- Innovative healthcare design to Improve maintenance
- Innovation in healthy workplaces in all sectors
- Promoting healthy lifestyles and active ageing through better environments

Authors are invited to submit abstracts of 400 words in English. The abstract should clearly state the objectives, methods used, results and conclusions. The paper will be presented to an audience with diverse interests and disciplines. Consequently, we are seeking presentations that focus on the practical importance of environmental design qualities that promote health and wellbeing.

All abstracts will be reviewed by the Scientific Committee. A limited number will be selected for oral presentation as full papers; others will be presented as posters. **All papers will be subjected to a blind peer reviewed process.**

All abstracts and enquiries should be submitted by e-mail to the WCDH 2017 Secretariat no later than 30 October 2016 at the following address:

WCDH 2017 Secretariat, International Academy for Design & Health

E-mail: info@designandhealth.com

Tel: + 46 70 453 90 70

Proposals must include a title, author(s), organisational affiliation, and three keywords. Papers chosen for presentation will be published in the Final Programme and Book of Abstracts, with selected papers published in journal World Health Design. The author(s) or co-author(s) should register and pay the registration fee in order to present the paper at the conference.

Design & Health

12th World Congress, Vienna-Austria12-16 July, 2017

Timetable

1st June 2016
First Announcement and Call for Papers

30 October 2016
Deadline for Abstracts of Papers

15 December 2016
Authors notified of decision of Paper acceptance

15 January 2017
Preliminary Programme and Registration Opens

15 May 2017
Deadline for Early Bird, Speaker Registration and Final Manuscript

1st July 2017
Final Programme/Book of Abstracts published

September 2017-2018
Selected papers will be published in World Health Design

Congress dates and schedule

The WCDH 2017 is a five-day event, held from 12-16 July, 2017 at the Hofburg, historic city center of Vienna, Austria

Wednesday 12 July 2017
Registration from 14.00-18.00
Pre-congress symposium
Opening ceremony and Welcome reception from 19.00 at City Hall

Thursday 13 July 2017 Congress & Exhibition
Late registration from 08.00-09.00
Congress and exhibition from 09.00-18.00
Social programme to be advised

Friday 14 July 2017 Congress & Exhibition
Congress and exhibition from 09.00-18.00
Advisory board meeting of the International Academy for Design & Health from 19.30

Saturday 15 July 2017 Congress, Exhibition & Academy Awards Gala Dinner
Congress and exhibition from 09.00-18.00
Academy Awards Gala Dinner from 19.00 at City Hall

Sunday 16 July 2017 Architectural Study Tours
Site tours and visits to local landmarks and health facilities

15 July 2017
City Hall, Vienna, Austria

Design &Health
International Academy for Design and Health

International Academy Awards

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Entry Deadline 1st April 2017

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Setting benchmarks in global Salutogenic design

The 2017 Design & Health International Academy Awards, the leading international advocacy programme recognising professional excellence in the research and practice of designing healthy built environments, has opened for entries.

The Design & Health International Academy Awards has a significant influence on the design and development of humanistic environments that support health, wellbeing and quality of life around the world. This year, the programme comprises 10 categories across the key areas of international health delivery.

The final awards, which will be presented at a prestigious ceremony to be held on 15 Junly 2017 in the City Hall in Vienna during the 12th Design & Health World Congress, will reflect important aspects of the exceptional work undertaken by researchers and practitioners at the forefront of the field. Recipients of the awards will be those teams and individuals who, through outstanding efforts, have contributed to the progress of knowledge and demonstrated vision and leadership in exemplary initiatives within the field.

The 10 categories include: Health Project (over 40,000sqm); Health Project (under 40,000sqm); Future Healthy Environment Project; Research Project; Mental Health Design; Sustainable Urban and Built Environment; Interior Design Project; Use of Art in Public and Private Spaces and Lifetime Leadership Award.

Eligibility

Built projects or research programmes completed between 1 January 2014 and 30 June 2017 are eligible to enter. The exceptions are the Sustainable Design Award, which allows entries of projects completed after 1 January 2010 and the Future Health Project
Award, which only allows submissions of unbuilt or conceptual designs. Projects may be entered into multiple categories, provided they are tailored to meet the specific requirements for the judging criteria of each award, but may not be re-entered in the same category in subsequent years. The closing date for each entry is 1 April, 2017.

Judging panel and criteria

The judging panel consists of a group of independent experts from around the world. Experts in their field, the judges come from multidisciplinary backgrounds in research and practice. Each award has its own criteria defined by the lead judges in each category (see awards entry form).

How to submit

Complete the entry form and the 750-word submission statement and send to the address on the form together with a maximum of 10 powerpoint slides. To download the awards entry form and submission statement, visit www.designandhealth.com

Judging process and timetable

The judging process consists of a two-phase process:

1st August – Call for Entries / Awards open for Submissions

1 April 2017– Deadline for receipt of Submissions

2 April – Phase 1: Entries are scored remotely by each judging panel against the approved criteria. The scores are forwarded to the category chairs who make a recommendation on the shortlisted entries and award winners.

13 May: Awards shortlist announced. Shortlisted projects are expected to register and attend the 12th Design & Health World Congress in Vienna to present their project in a poster display and receive their award, either as an award category winner or a commended project. They may be required to elaborate on their submitted project to the judges or provide further information as required.

May/June – Phase 2: Members of the judging teams report their final award decisions

15 July 2017 – Awards Ceremony & Gala Dinner at 12th Design & Health World Congress & Exhibition in the City Hall Vienna.

The judging panel Design and Health Academy Awards 2017


Nicola Bertrand


Gunther de Graeve


Albert Wimmer


Eve Edelstein


Innocent Okpanum


Alan Dilani


James Barlow


Vivien Mak


Tye Farrow


Mungo Smith

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International Academy Award 2015 Report

Rewarding global excellence in research and practice

The Design & Health International Academy Awards is the leading advocacy program in the world recognizing professional excellence in the research and practice of designing healthy built environments. Tonight we will be presenting award winners from 10 Categories.

1. **International Research Project**
2. **Health Project Under 40,000m2**
3. **Mental Health Design**
4. **Use of Art in Public and Private Spaces**
5. **Future Healthy Built Environment Project**
6. **Sustainable Urban and Built Environment**
7. **Interior Design Project**
8. **Salutogenic Design Project**
9. **Health Project Over 40,000m2**
10. **Lifetime Leadership Award**

Before we make the award announcements, I would like to thank all of the judges who committed their valuable time and intellect to the judging process of this year's awards. Due to time constraints, unfortunately we will not inform you of the finalists, but you will find them published later on in the journal World Health Design.

Judging Criteria

The decisions of each judging panel were based on criteria specific to each category, including design/ creative approach and values; sustainability; planning and organisation; operational efficiency; stakeholder engagement; hospitality, wellness and culture; health promotion; innovation; accessibility and context; research methodology; and function and performance. The winners of each award were determined by a lead judge, supported by a panel of two or three judges with proven expertise. Each judging panel comprised experts in their field from multidisciplinary backgrounds.

Lifetime Leadership Award

Awards Chair
Prof. Alan Dilani (Sweden)

Panel of Jury
Local Organizing Committee (Hong Kong)

Criteria
An award for an outstanding healthcare building where human health considerations are as evident as clinical and managerial priorities. The project must demonstrate an understanding of the principles of salutogenesis, and show how innovative design permits ongoing flexibility of use and addresses issues of sustainable healthy building.

Winner
EDWIN WONG JP, B.Arch.(N.Z.); FNZIA; FHKIA

The International Academy for Design & Health has awarded Mr. Edwin Wong JPB Arch. (N.Z.); FNZIA; Leadership Award for 2015.

Awarded by the Academy every year to a healthcare leader and visionary who has shown an ongoing, lifelong commitment to enhancing the health, wellbeing and quality of people's lives through their dedication to healthcare design, the award recognises the human and personal qualities needed to push back the boundaries of progress and inspire future generations.

The award was announced during the Gala Academy Awards Dinner at the 11th Design & Health World Congress & Exhibition in Hong Kong, held from 15-19th July, and presented by the Academy's founder Prof. Alan Dilani together with former Lifetime Leadership Award winners, Prof Ian Forbes.

Mr Edwin Wong, the winner of Design and Health Lifetime Leadership Award 2015, is a visionary leader in healthcare design in Hong Kong. He was born in 1926, New Zealand and obtained a Bachelor of Architecture from Auckland University, New Zealand. He is a Fellow of the New Zealand Institute of Architecture and the Hong Kong Institute of Architecture. He received the Royal Institute of British Architects Bronze Medal for the Queen Elizabeth Hospital project, Kowloon, HK, and the silver medal from HKIA as the architect for the Kowloon Hospital project. Throughout the 1960s and 1970s, as the Government's Hospital Chief Architect, he oversaw the development of many hospital development projects to meet Hong Kong's urgent needs. He is a source of inspiration for future generation.

He designed following hospitals: Queen Elizabeth Hospital 1400 beds in1958, Kowloon Hospital (west wing) 500 beds in 1967,Princess Margaret Hospital 1300 beds in 1968, Kwai Chung Psychiatric Hospital 1000 beds in 1970, Prince of Wales Hospital 1200 beds in 1975, Prince Philip Dental Hospital -- 1978, Tuen Mun Hospital 1200 beds in 1980, The Ruttonjee Hospital 500 beds in1981.

Edwin Wong the winner of Lifetime Leadership Award in Center

In view of his many hospital involvements over the years in various parts of the world, he is popularly known in Hong Kong as "the father of hospitals".
1981-96 He retired from the civil service and joined the Hongkong Land Company where he functioned as a design consultant.

1997-2010 He freelanced as a consultant with leading organizations, including notablythe Chinese University of Hong Kong. Since attaining the age of 85, he has formally retired.

Research Award

Best Student Research Project
Best Non- Student Research Project
Best Ph.D. Research Project

Lead judge

Prof. James Barlow, Imperial College London (UK)

Criteria

International Research Award, Research Project Awarded for a completed, innovative, independently assessed, piece of research focused on a particular aspect of the design, function, construction, financing or maintenance of a healthcare facility or addressing a relevant topic concerning public health in the context of the working environment.

Winmer of Best Student Research Project
Healthy Circulation
"Focus on the efficiency of healthcare layouts, but unlike most previous work on in-patient wards, it looks at circulation spaces in primary care centres in England. The report presents a review of changing guidance and policy, and research literature on the links between design principles and user experience. A well-designed and well-executed project of a high standard for a student project." Authored by Marc Levinson, UK.

Winner of Best Non-Student Research Project
Design for People Living with Dementia
"Dementia is the growing concern for the public, policy maker and healthcare providers, and dementia-friendly living environments will need to be created at scale in the future. The research studied 115 pilot projects funded by the UK's Department of Health to identify research gaps and cost-effective solutions. It also developed salutogenic indicators for dementia-friendly environments." Authored by Efthimia Pantzartzis, Federica Pascale and Andrew D. F. Price , UK.

Winner of Best Ph.D. Research Project
Evaluation of Healthcare Facilities
"A multi-methodology study on how different features may impact on usage of break rooms and perceived levels of restoration. The study surveyed nearly 1000 nursing staff and also included focused interviews and narrative survey questions. The topic is critical because little research focuses on staff needs, despite the known relationship between staff well-being and quality of patient care. A methodologically sophisticated and well written study, producing important findings." Authored by Adeleh Nejati, PhD, MArch, EDAC, USA

Health Project

Under 40,000 sqm

HASSELL

Lead judge

Vivien Mak, P&T Group (Hong Kong)

Panel

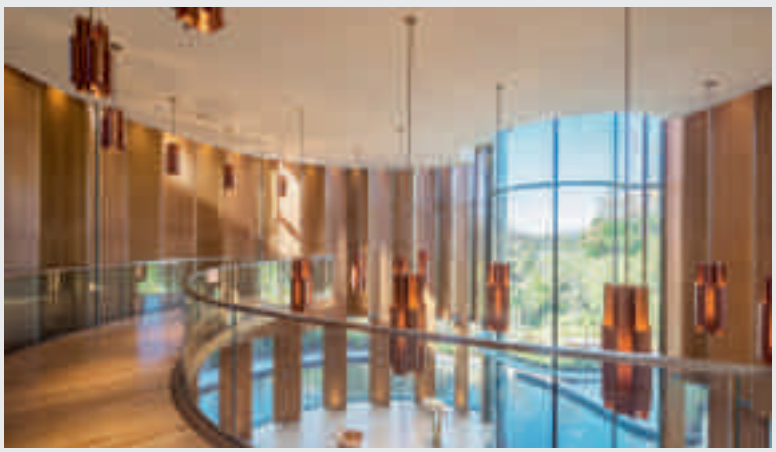
Hank Adam, HDR Inc.(USA)
Nadia Tobia, Tobia Architects (Canada)

Criteria

An award for an outstanding healthcare building where human health considerations are as evident as clinical and managerial priorities. The project must demonstrate an understanding of the principles of salutogenesis, and show how innovative design permits ongoing flexibility of use and addresses issues of sustainable healthy building.

1st Highly Commended

The Lane Fox REMEO Respiratory Centre, UK. Commissioned and Managed by BOC LTD. Designed by MURPHYPHILIPPS Architects.



2nd Highly Commended

Residence for the Sisters of St. Joseph of Toronto, Canada. Commissioned by The Sisters of St. Joseph of Toronto. Designed by Brigitte Shim and Howard Sutcliffe.

Winner

Shoalhaven Cancer Care Clinic, NSW Australia.
Commissioned by Health Infrastructure NSW.
Designed by HASSELL.

The SCCC engages with the surrounding landscape to create supporting environment for healing. The building and its individual treatment and consultation spaces are set around a central courtyard and sited to take advantage of the views whilst maximising access to natural light for all areas . Focus around the central courtyard and atrium as well as prevalent external views provide orientation points to patients and carers.

Mental Health Design

Lead judge
Mungo Smith, MAAP Architects (Australia)

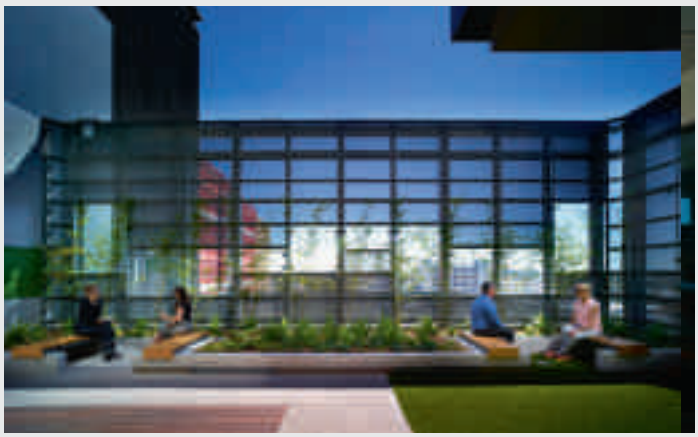
Panel
Ken Schwarz, AECOM (USA)
Dr. Jan Golembiewski, QUT (Australia)

Criteria
An award for a mental health facility where an effective reconciliation between operational requirements for security and supervision and the imperative for a civilizing and humane environment that supports therapeutic intervention is evident. Submissions should show an understanding of the principles and practice of salutogenesis.

1st Highly Commended
Inclusive Playground for Children of Special Needs. Commissioned by International China Concern. Designed by Rehab Aid Society - Calvin Luk & Kevin Au.

2nd Highly Commended

Vermont Psychiatric Care Hospital. Commissioned by Department of Buildings & General Services, Vermont, USA. Designed by Francis Murdock Pitts.



3rd Highly Commended

The Professor Marie Bashir Centre. Commissioned by Health Infrastructure NSW, Australia. Designed by Peckvonhartel and Silver Thomas Hanley.

Use of Art in Public and Private Spaces

Lead judge
Nicola Bertrand, John Staff Consultant (Australia)

Panel
Dr. Calvin Luk, Hong Kong Polytechnic University
Dr. Whitney Austin Gray, WELL Building Institute (USA)

Criteria
An award that recognizes the effective application of creative endeavor which further advances knowledge of the potential of the arts to support therapeutic outcome and impact the health process. Preference will be given to success in new and innovative approaches of using Art in public spaces to create mental process and thereby stimulate positive emotional experience.

1st Highly Commended
Europe Hospitals Emergency Department, Belgium. Commissioned by County council of Brussels. Designed by VK Architects & Engineers.

2nd Highly Commended
Lady Cilento Children's Hospital. Commissioned and Managed by Queensland Health. Designed by. Designed by Conrad Gargett Lyons (joint venture).

Winner

ARTERIE. Commissioned by Chris O'Brien Lifehouse.
Designed by Amanda Solomon/ Deborah Burdett.

Arterie is a multipronged model of art participation that benefits Arts and Health. Carterie in waiting & treatment spaces is a mobile studio with pre-packaged activities designed with health limitations (neuropathy, fatigue, nausea) in mind, providing therapeutic distraction from treatment. Arterie improves Health outcomes for patients, families, carers, staff & visitors by easing the side effects of cancer and its treatment (stress, pain, fatigue, isolation and depression). Arterie provides benefits to the Arts by providing placements and mentorship for artists.

Future Healthy Built Environment Project

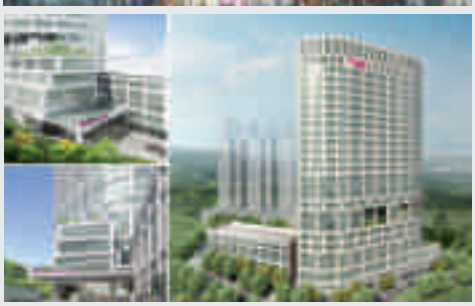
Lead judge
Richard Sprow, Perkins Eastman (China)

Panel
Diane Gray, Mario Corea Architects (Spain)
Mikael Paatela, PAATELA & Co ARCHITECTS (Finland)

Criteria
An award for the design of a future any built environment that recognizes the changing role of the built environment in relation to health and wellbeing of people or local community. The project must demonstrate a 'Salutogenic' vision for healthy environments that addresses anticipated socioeconomic challenges of the future.

1st Highly Commended
The Extension of the People's Hospital of Futian, Shenzhen, China. Commissioned by The People's Government of Futian District, Shenzhen. Designed by Leigh & Orange Ltd Hong Kong.

2nd Highly Commended
Children's Hospital of Richmond Pavilion (CHoRP). Commissioned by Virginia Commonwealth University Health System. Designed by HKS Architects, USA.



3rd Highly Commended
Tsuen Wan Adventist Hospital Extension.Commissioned by Tsuen Wan Adventist Hospital. Designed by P&T Architects and Engineers Ltd, Hong Kong.

Winner

Brisa de Atalaia, Damha Sergipe, BRAZIL
Commissioned by Coqueiros LLC.
Designed by IN-VI / AECOM.

Each design decision sought to make the physical efforts of living in the community a natural pleasure and a healthy measure. Buildings are no more than 5 levels in height with day lit stairs. Necessities are within a 400 meter walk for all residents. Sports facilities are connected by cycling paths and rubberized fitness trails which traverse the neighborhood while safe playgrounds are within a 70 meter walk for residents.

Sustainable Urban and Built Environment

Shim-Sutcliffe Architects

Lead judge
Lim Lip Chuan, CPG Corporation (Singapore)

Panel
Angela Lee, HKS (USA)
Bill Doerge, PerkinsWill (USA)

Criteria
Awarded for a healthcare project or any type of health community and urban planning completed after 1 January 2008 that can demonstrate sustainability performance above the mandatory norm, satisfies legislative, technical, financial and moral imperatives, and shows understanding of the principles of salutogenic and ecological design.

1st Highly Commended
Hong Kong Velodrome and Town Park. Commissioned and Managed by ArchSD and LCSD, HKSAR. Designed by P&T Architects and Engineers Ltd.

2nd Highly Commended
Miasteczko Wilanow District, POLAND. Commissioned and Managed by Prokom Investments. Designed by IN-VI/AECOM.

Winner

Residence for the Sisters of St. Joseph of Toronto.
Commissioned by The Sisters of St. Joseph of Toronto.
Designed by Brigitte Shim and Howard Sutcliffe.

"The new home for the Sisters of St. Joseph of Toronto will be a sacred space dedicated to nurturing community and providing a base for continued ministry and outreach. It will demonstrate simplicity, beauty and wise use of materials and spaces. Accommodation suited to varied needs will be welcoming, ecologically sustainable, designed in harmony with nature and with flexibility and potential for diverse use now and into the future." -Congregation of the Sisters of St. Joseph of Toronto, 2008.

Interior Design Project

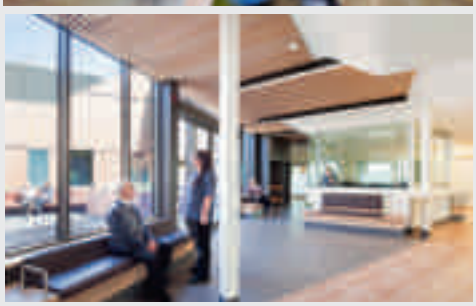
Lead judge
Linda Bishop (China)

Panel
Karen Muraoka(USA)
Natalie Walsh (Australia)
Nicola Bertrand (Australia)

Criteria
Interior Design Project, An award to recognize a therapeutic space that enhances the health, wellbeing and quality of life of the patients, staff and visitors. Preference will be shown to innovative projects, which show understanding of the principles of salutogenesis, respect the privacy and dignity of patients, as well as provide a enjoyable experience that reduce stress.

1st Highly Commended
Qingdao United Family Hospital, China.Commissioned by United Family Healthcare. Designed by Robarts Spaces.

2nd Highly Commended
Lady Cilento Children's Hospital. Commissioned by Queensland Health. Designed by Conrad Gargett Lyons (joint venture).



3rd Highly Commended
The Mornington Center Stage 2. Commissioned by Victoria Government, Australia. Designed by Billard Leece Partnership.

Winner

Vermont Psychiatric Care Hospital. Commissioned by Department of Buildings & General Services, Vermont, USA. Designed by Architecture+

The scale of this hospital is unique. It is a full-service hospital where meals are made from scratch, religious practices are accommodated, and animals are welcome. The highest level of mental health care is provided in what feels like a home; no more than 8 patients share a house. The vehicle sallyport, through which most patients arrive, is a prominent feature at the front. The continuum of care administered commences with grace and proceeds with serenity and respect. The lobby is an open, welcoming room with views to the courtyard.

Salutogenic Design project

Lead judge
Stéphane Vermeulen, VK Architects & Engineers (Belgium)

Panel
Dr. Innocent Okpanum, (South Africa)
Prof. Alan Dilani, IADH (Sweden)

Criteria
Salutogenic Design Project, Awarded for the design of a completed project of any type of built environment, which clearly demonstrate that are comprehensible, manageable and meaningful, thereby fostering a strong sense of coherence amongst its users that promotes their health and wellbeing. Submissions must show how environmental, social and economic sustainability is improved.

1st Highly Commended
Healthcare Environment
Shoalhaven Cancer Care Centre, NSW Australia. Commissioned by Health Infrastructure NSW. Designed by HASSELL.

2nd Highly Commended
The Mornington Center Stage 2. Commissioned by Victoria Government, Australia. Designed by Billard Leece Partnership.

Winner - Healtcare Design

Lady Cilento Children's Hospital. Commissioned and managed by Queensland Health. Designed by Conrad Gargett Lyons (Joint venture).

The new building provides a positive, rich and stimulating architectural experience that incorporates healing landscape gardens and a vibrant art program. The design focuses on the clients' stated aspirations, (developed during early stakeholder Workshops) of promoting legibility and wayfinding, creating meaningful connections between the hospital and the local community while providing access to greenspace from clinical spaces throughout the new facility.

Winner - Rehabilitation

SOCSO Rehabilitation Centre. Commissioned and managed by Social Security Organization Malaysia. Designed by ANUAR AZIZ ARCHITECT

The buildings are placed sensitively on existing topography, maintaining and enhancing the space wherever possible. Each building is given a different identity according to functions and for ease of wayfinding. For a serene environment, calming and soft colours are utilised throughout the complex. Great emphasis is also given to green design with details such as north-south orientation, natural lighting and ventilation, 'wind corridor', low-E glass, and fixed and movable sun shading panels. The complex is also a conscious move from the 'hospital' outlook into a more informal or resort environment.

Winner - Health Promotion

Gardens by The Bay, Marina South. Commissioned and managed by National Parks Board Singapore. Designed by Grant Associates, Wilkinson Eyre Architects & CPG Consultants Pte Ltd.

Community health is promoted in the gardens through supporting active healthy lifestyles, within a setting designed to facilitate social and nature interaction. The night lighting design also transforms the gardens into a mesmerising magical visual spectacle which brings a different user experience at night. Public gatherings and many social events are drawn in by this sensory experience, encouraging people to interact with nature beyond the hours of daylight. Environmental balance and sustainability through social economic designed for families, young and old, to foster community bonding.

International Health Project

Over 40,000 sqm

Lead judge
Albert Wimmer, Wimmer Architects (Austria)

C.F. Møller

Panel
Mario Corea, Corea Architects (Spain)
Nadia Tobia, Tobia Architects (Canada)

Criteria
An award for an outstanding healthcare building where patient-centred considerations are as evident as clinical and managerial priorities. The project must demonstrate an understanding of the principles of salutogenesis, and show how innovative design permits ongoing flexibility of use and addresses issues of sustainability.

1st Highly Commended
Clinica Las Condes, Phase 1 expansion. Designed by RTKL Associates Inc.

2nd Highly Commended
North Lantau Hospital, Hong Kong. Commissioned and managed by Architectural Services Department, The Government of HKSAR. Designed by Simon Kwan & Associates Ltd.

3rd Highly Commended
Lady Cilento Children's Hospital. Commissioned by Queensland Health. Designed by Conrad Gargett Lyons (joint venture).

Winner

Akerhus University Hospital, Norway. Commissioned by Helse Sør Øst RHF.Designed by C.F. Møller Architects.

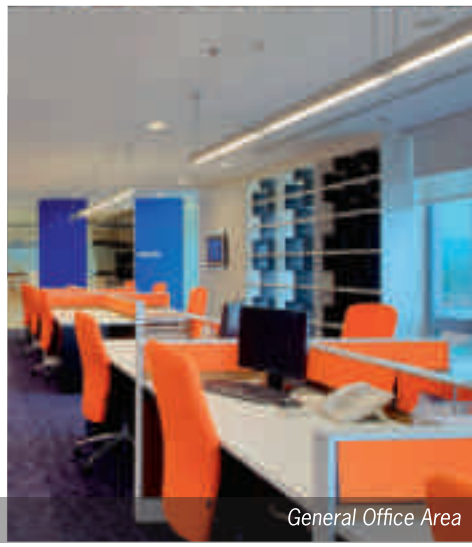
The Akershus University Hospital in Oslo- Norway has been designed to emphasise security and clarity in rich surroundings, whereby everyday functions and local materials are integrated into the hospital's structure. The materials expressed in the design are rich in variation. However, the expression is unified by a general architectural theme centered on panels and transparency creating a unity between the individual parts and furthermore a subtle vision of transparency and depth. The main central, glass roof thoroughfare, links the various buildings and departments.

SOCSO Rehabilitation Centre, Malacca, Malaysia — Adminsistration Block

Medical Rehab Block and Sanctuary Garden at Folded Roof

Arte Axis Design Group (AADG) Office, Petaling Jaya, Malaysia

Main Reception Area



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DESIGN GROUP

ANUAR AZIZ ARCHITECT (a member of Arte Axis Design Group)
601 C, Level 6, Tower C, Uptown 5, No. 5, Jalan SS21/39, Damansara Uptown, Petaling Jaya, Selangor, Malaysia.
Tel: +603-7726 3875 Fax:+603-77263894 Email: admin@arte-axis.com Web: www.arte-axis.com FB: www.facebook.com/ArteAxis

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Designs for Health and Well-being: Tackling NCD Challenges in the 21st Century

EK Yeoh, Lancelot Mui

For the first time in history, the number of older people (aged 60 years and above) will exceed the number of children by Year 2047, according to estimation by the United Nations (1). There were 841 million older people in 2013, which is about 11.7 per cent of the world population. That number is expected to increase to more than 2 billion in 2050, or about 21.1 percent of the world population. The combination of decreasing mortality and declining fertility are significant contributing factors to this trend. The proportion of people who are aged 80 years or above (the oldest old) is expected to rise from 14 percent in 2013 to 19 percent in 2015. The aging population brings with it the challenges of increasing prevalence of non-communicable diseases (NCDs).

NCDs include cancers, cardiovascular diseases, diabetes, hypertension, depression, dementia and other degenerative diseases, etc. The top 4 NCDs globally are cardiovascular diseases, cancers, diabetes, and chronic lung diseases (2). Global NCD-related death has increased from 60 percent to 68 percent in just 12 years (from 2000 to 2012) (2). And that figure will continue to rise just from population growth and aging alone, according to the United Nations(1). All countries will be affected regardless of their level of development.

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (3). Although there is no consensus in the definition of well-being, in general, well-being can be described as "judging life positively and feeling good" according to the US Centers for Disease Control and Prevention (4). Recently Naci and Ioannidis further proposed the concept of wellness as "diverse and interconnected dimensions of physical, mental, and social well-being that extend beyond the traditional definition of health. It includes choices and activities aimed at achieving physical vitality, mental alacrity, social satisfaction, a sense of accomplishment, and personal fulfillment." (6).

Although increase understanding of the various diseases and advances in medical science will save some of those lives, escaping death often means that the patients have to continue to live with the disease for the rest of their lives because many of the NCDs are incurable. Most NCDs will require long-term, continuous management to reduce the likelihood of exacerbations, and disabilities complications. To add to the complexity of the situation, people are likely to have more than one NCD. For example in Hong Kong, 70.4 percent of the older people have at least one NCD, with 9.5 percent of them having four or even more (5). The most common NCD among the Hong Kong older people include hypertension, diabetes, arthritis, eye diseases, high cholesterol and heart diseases. Medical treatment alone will not be enough to achieve a state of health and well-being that can provide sufficient quality of life to the patients.

Many of the older people will be economically inactive. In a survey by the Census and Statistics Department, 86.3 percent of the older people living in Hong Kong are either retired, work as a home-maker, or otherwise not active economically (5). Even for someone who has some retirement savings, the treatment costs for cancer or heart attack can easily wipe out those savings. That can severely affect the sense of well-being for the individual. In addition, family members might also be involved, either to pay for the treatment and care-takers, or in some cases economically active family members had to give up their job in order to take care of the person with NCD.

Since having NCD potentially affects the patient's quality of life and may be expensive to manage, the better option would be to invest more in primary prevention to reduce the chance of getting NCD in the first place. The World Health Organization has long recognized that unhealthy diet, physical inactivity, and tobacco use are the 3 major modifiable risk factors for NCD (6). In order to change these unhealthy behaviors, a popular strategy is to increase people's knowledge about the adverse consequences of those behaviors. The thinking is that once people have the relevant knowledge, their attitude will change to favor the more healthy behaviors, and then actual practice will follow. This is commonly known as the KAP approach (knowledge-

attitude-practice). The KAP approach is popular among practitioners in health promotion because of its simplicity and intuitiveness.

On the other hand, although the framework is intuitive, the actual intervention based on this approach is not as simple. For example, what kinds of knowledge are needed to change people's attitude? Would the attitude change be strong enough to generate the motivation or intention to change? Do people have enough skills to sustain the new behavior? Do they have enough support to engage in the new behavior? How can one prevent people from going back to the old behavior? Answers to many of those questions cannot be found if one only applies the KAP approach because it only addresses the intrapersonal factors that affect behavior.

Health is not just a personal responsibility. The Ottawa Charter for Health Promotion states that "Health is created and lived by people within the settings of their everyday life; where they learn, work, play and love. Health is created by caring for oneself and others, by being able to take decisions and have control over one's life circumstances, and by ensuring that the society one lives in creates conditions that allow the attainment of health by all its members." (7). In order to achieve that, health promotion needs to look beyond just the individuals and start examining the various social determinants of health from an ecological perspective (e.g. lifestyle factors, community networks, living and working conditions, socioeconomic, cultural, and environmental conditions).

ECOLOGICAL PERSPECTIVE

Ecological models of behavior change generally recognize that there are multiple levels of influence to people's behavior, including intrapersonal (e.g. knowledge, attitudes, values, preference, etc.), interpersonal (e.g. family, friends, colleagues, etc.), organizational (e.g. workplace policy, school policy, etc.), community (e.g. infrastructure, culture, economics, etc.), and public policy (e.g. laws and regulations). From the ecological perspective, in order to achieve the desired outcomes(s), one needs to systematically target factors across multiple levels that are important for the specific behavior.

The fight against tobacco is a useful reference for an ecological approach to change behavior. Education and communication campaigns to warn people about the danger of tobacco are there to increase people's knowledge and target a change of their attitudes (intrapersonal level intervention). Warning labels on cigarette packaging is another approach to educate people about the adverse health effects of cigarette smoking (intrapersonal), but it is only made possible by the passage of a law requiring tobacco companies to redesign their packaging (public policy to drive organizational change). However, since tobacco is addictive, one can make it easier for smokers who want to quit by providing supportive service like smoking cessation clinics and quit-lines (community level). Legislations need to be passed to ban tobacco advertising and sponsorship to reduce the exposure to tobacco messages (public policy to change organization and community). Taxes for tobacco products can also be raised to increase the cost to smoke and act as a monetary disincentive for smoking (public policy). The passage of smoke-free laws to set up smoke-free environments will further reduce the cues to smoke for smokers (public policy changing community), as well as reducing harm from second-hand smoke to non-smokers. All of these make quitting a norm and increase the chance that people will encourage smokers around them to quit (interpersonal).

HEALTH PROMOTING ENVIRONMENTS

The World Health Organization recognizes that many of the modifiable risk factors for NCDs and their underlying social determinants can be reduced through the creation of environments that support and promote health (8). But what are environments that support and promote health?

Figure 1 shows a typical "smoking room", it serves to separate the smokers from the non-smokers so that the impact from second-hand smoke can be minimized. Since smoking is an addictive but legal behavior, this smoking room also allows smoker a venue to smoke in an otherwise non-smoking area without running afoul of the law. But does this design of the smoking room serve the bigger public health goal of reducing tobacco smoking?

Figure 1: Smoking Area with Transparent Wall

We know that the mere presence of ashtray and other smokers can trigger the desire to smoke (9). The design of the smoke room in Figure 1 places triggers to smoke in plain view of other smokers. Therefore, this design is successful if the desired outcome is to give smokers a legal place to smoke without affecting the health of the non-smokers. However, it fails the ultimate public health goal of reducing smoking in the population.

Housing and built environments have significant impact on people's health. Many people spend the majority of each day in indoor environments such as their home, workplace, classroom, shops, etc. The design and quality of those environments will have profound influence on health. In a report released by the World Health Organization, it points out that although many housing laws are originally set up out of public health concerns, the contemporary standards tend to be more technological-oriented rather than based on concern for the health of building occupants

(10). The report highlighted some area of concern for home environment, including home injuries, indoor air quality, pests, crowding, water and sanitation, location, and climate protection function. Inadequately-designed home increases the risk of home injuries; poor indoor air quality can lead to respiratory diseases and even cardiovascular diseases; illness and even deaths can happen due to extreme temperatures; overcrowding can adversely impact mental health; the location of residential sites can expose residents to environmental risk such as flooding and pollution. On top of those, pest infestation will increase the risk of communicable diseases. And in some developing countries, inadequate access to safe water for both drinking and sanitation purpose will increase the risk of diarrheal diseases, which is a major cause of deaths in those countries (11).

The Ottawa Charter for Health Promotion (7) recognized the influence of the environment on people's behavior and advocates that environments should be designed to facilitate the healthier choice. There is some evidence that links built environment to risk factors for the top NCDs: cardiovascular diseases, cancers, diabetes, and chronic lung diseases. For example asthma, a chronic lung disease, can be triggered by ground-level ozone (12). The design of urban built environment can significantly impact the amount of road-size ozone. Lack of physical activity is a major contributor to cardiovascular diseases, cancers, and diabetes. The presence of parks and open space has long been recognized as factors that can promote walking (13). Renalds et al. reviewed the impact of built environment on health and found that physical activity level is correlated with walkability and residential density, size of neighborhood blocks, proximity to retail stores, land use mix, accessibility to public transit, security, neighborhood upkeep, presence of light and scenery (14). Urban design that leads to high commute time was found to be associated with both physical inactivity and obesity (15). In a study by Li et al., the researchers found that the density of fast-food outlets was associated with overweight and obese communities (16), which suggests a possible cause of unhealthy diet. For people living near factories, their chance of exposure to chemical carcinogens is higher and thus carry a higher risk of cancer. The US Centers for Disease Control and Prevention suggests that a healthy built environment needs to have plenty of parks for exercise and relaxation, playgrounds for the children to play, sidewalks that facilitate walking and jogging (17).

In addition to the built environment, the social environment is also very important. Environment that encourage social interaction can enhance social capital, which will in turn improve people's mental health (18). People in a good social environment would encourage each other to adopt healthy behaviors.

On the other hand, Bancroft et al. recently called into question the long-held belief that access to parks are associated with physical activity (19). Their review found conflicting evidences for the relationship between the two. However, an interesting finding from their review is that subjectively described neighborhood park environment is a better predictor of physical activity than independently-measured park characteristics. This suggests that our understanding of how people react to and interact with the environment is still inadequate.

Changing lifestyle is a continuous, long-term effort that is riddled with barriers. Traditional health promotion assumes that people are rational beings who would act according to the best of their interest once they know the facts. But the reality is more complex. For example, we know physical inactivity is still a major cause of NCD, many campaigns have tried to educate the public about the benefits of exercise in order to motivate them to become active.

However, when people were asked about whether they know the benefits of physical activity and exercise, the vast majority know; when they were asked whether they think being physically active is a good thing, most of them said yes. So people do know about the benefits, and have favorable attitudes towards it, and yet they may not act and continue to be sedentary.

MAKING CHOICES FOR BETTER HEALTH

Making choice is difficult, it is especially difficult if people were to weigh all the pros and cons of their every action. For decisions that only require people to act once, for example organ donation registration, it is relatively simple because after one has decided to register, they only have to act once. But for lifestyle change decisions, the situation is much more complex, as decisions are revisited and repeated.

Figure 2 outlines an example to illustrate what an inactive person might have to go through if they want to become more active. People who are motivated to become more active typically have one or more of the following barriers: lack of time, lack of energy, and existing health conditions, with lack of time being the most often cited barrier. People have to spend time working in order to earn income to fulfill their economic needs, the workplace policies might have required them to spend long hours at work, and at the same time, some workplaces might have social expectations for overtime work. Then there are also family obligations. Aging population means that there is a higher chance of having older members in the family who need to be taken care of; reduction in fertility rate may lead parents to heavily invest their time in the upbringing of their children; expectation from schools that parents are to be actively involved in the education of the children also takes time away from physical activity. Even if one wants to spend time with family on leisure activities, doing exercise is but one of the possible activities. The inactive person themselves might be more interested in other, more sedentary, activities. Also family members might have other sedentary activities that they are interested in and want the companionship of the inactive person. All of these take time, time that might be considered well-spent because it increases financial well-being and family relationships.

Even if time is less of an issue, people might be tired after a long day of work and feel they do not have the energy to exercise. Long working hours also would make people

Figure 2: User experience of choosing to be active

want to take rests during day off and weekend instead of doing exercise even if they think it will be beneficial. In some competitive industries, people might even be expected to work during weekends. A tight employment market might not allow them to switch to a job with more manageable hours. People who want to live a healthier lifestyle ended up staying sedentary because of all the other choices that they have to make on their everyday life.

Another example is the promotion of healthy eating. Typically people are recommended to follow nutritional guidelines such as the Eatwell Guide in the UK (20),which recommends that people should "Eat at least five portions of a variety of fruits and vegetables a day; base meals on potatoes, bread, rice, pasta or other starchy carbohydrates. Choose wholegrain where possible; have some dairy or dairy alternatives (such as soya drinks and yoghurts). Choose lower-fat and lower-sugar options; eat some beans, pulses, fish, eggs, meat and other protein. Aim for at least two portions of fish every week – one of which should be oily, such as salmon or mackerel; choose unsaturated oils and spreads and eat in small amounts; eat food high in fat, salt and sugar less often and in small amounts; drink plenty of fluids – the government recommends 6–8 cups/glasses a day". Imagine the number of decisions and choices one has to make in order to follow exactly what this guide recommends. Research have found that people have to make 200-300 decisions about what to eat on a typical day (21).

If we think about smoking cessation, smokers who are trying to quit are constantly affected by cravings and withdrawal. They have to decide not to smoke every time they feel an urge to light up, when they see someone else smoking, or simply see a lit cigarette, or a bunch of cigarette butts in an ashtray, or even simply an empty ashtray. They might need to choose to take a detour to avoid a street corner or alley which they know to be popular smoking spots. Decision after decision have to be made every second in our everyday lives. If one has to think through every single decision, the majority of one's time and energy would have to be spent on weighting out options, and little left for action. However, most people seem to be doing fine, in making choices in their daily lives. This is because for the most part, we are living our lives through some sort of auto-piloting. We are not aware that we made those 300 dietary decisions every day because we don't actually think about them when we made the decisions.

Decisions that require deliberate thoughts are processed by the (slow) Reflective System (what some psychologists called the System 2). Using the Reflective System is mentally taxing, and requires the person to have complete information about the situation, which we usually don't have. Therefore, we mostly make decisions under familiar situations using the (much faster) Automatic System (System 1) to reduce cognitive loads. We typically use a few rules of thumb as mental short-cuts to make decisions through the Automatic System (22), that may appear as seemingly irrational behavior.

Health promoters are often perplexed about why intelligent people engage in irrational, self-destructive behaviors such as smoking or eating unhealthy food, while knowing that it increases their long term risk of NCD. Some might want to relief stress by smoking; others like to eat

tasty but sugary food; many like eating their favorite ice-cream while sitting in front of TV watching sports instead of doing it. That can be explained by two phenomena: loss aversion and temporal discounting. Loss aversion refers to the observation that people tends to strongly prefer avoiding losses even in the face of greater potential gains (23). And temporal discounting refers to the tendency of people to downplay the importance of future events, especially if it is uncertain. The typical lifestyle change health promotion requires people to give up their current behavior in exchange for a reduction of disease risk in the future. The current behavior or habit is usually something that people enjoy doing. In loss aversion, even though changing their current behavior might provide people with other benefits, they are unlike to choose to change because they do not want to lose the current benefits, the unhealthy behavior, which they enjoy

The benefits that life style changes in health promotion are often in the future, and it is uncertain whether the beneficial outcome would actually occur. Health promoters tell people that they need to exercise for 30 minutes per day on most days of the week in order to lower the risk of cardiovascular diseases, hypertension, etc. in the future. The younger a person is, the less likely they are going to react to this line of reasoning because "the future" is further away for them. Temporal discounting would make people care less about the future benefits the further it is in the future. In addition, even if one is to change their behavior, it only lowers the "risk" of having NCDs, with the outcome been uncertain. In people's mind, the future's uncertainty makes it even harder for them to justify changing their current behavior since they might still get NCDs even if they change their current lifestyle; at the same time, they might not get NCDs even if they don't change.

Because of loss aversion and temporal discounting, human beings are usually more concerned about immediate satisfaction over long-term benefits such as reduction of risk of NCD. Especially since the current behavior hasn't cause any significant adverse effect yet, and the desired behavior does not provide any real feedback about the supposed benefits.

GUIDED CHOICES BY DESIGN

Thaler and Sunstein coined the term "choice architecture" to reflect the needs to design an environment that could "nudge" people towards more desirable behaviors (24). Many people have the experience of buying more than they intended when they go to the supermarket. And many of those items might be impulse buys that are unhealthy. In fact, two-third of what people buy during their supermarket trip were not planned (25). The moment we step into a supermarket, the whole experience is designed. From the placement of colorful and fresh fruits and vegetables at the entrance so that the perishable stocks will be picked up first; to the placement of meat and dairy products in the back of the store to increase the time customers have to spend walking around the store and increase exposure to other products; and the strategic placement of candies and other easy to pick up items at the checkout counter to increase the chance that these will be picked up while customers wait in line; even to the use of background music to influence customers' pace (26). Products that the supermarket wants to promote to their customers are either displayed at eye level, or at the end of the aisles because the stores know that these locations attract attention. Similarly, products that are appealing to children are placed at their eye level. Everything is designed to nudge people in a subtle way to increase customer purchases of products.

The choice architecture approach respects the personal freedom to choose, and make an informed-decision. The key is to construct the different options in such a way that people are more likely to choose the more desirable option, even when their behaviors are controlled by the Automatic System. Attention should also be placed on the "user experience", the experience of the people who need to make the choice and change their behavior. From this perspective, one can see why asking people to join exercise class to promote physical activity would not be very effective. Exercise class requires the participant to go to a specific location at a specific time for a set duration, which makes it hard for people who have no time and no energy. People have to change their routine, give up their other duties, drop the things that they enjoy doing, to attend a short exercise session. That does not give people a good experience. Health promoters need to care more about people's needs and experience; they need to be more empathetic.

Many current efforts are designed from the top-down, often assuming that whatever worked in another place would work for the local population as well (just like it worked for medical treatment). Societal level health promotion efforts often do not consider population diversity. From marketing, we know that different groups of people behave differently, that is, they belong to different market segments. There is no reason to believe that segmentation won't happen just because the behavior is about health instead of buying a product because they are both fundamentally the same. Marketers and health promoters are both in the behavior change business.

We need to understand more about the factors that drive different segments' behavior. For example, price increase, such as increase cigarette tax, has been used on many occasions to limit consumption. It works on the assumption that people are price sensitive and would reduce consumption. However, Just and Wansink found that raising the price of all-you-can eat pizza buffet led people to eat more (27). It seems strange at first, until we realize that although raising the price might have turned some people away, but for those who are going to the buffet, they want to get what they paid more for, so they consume more. For the segment who decided that it is too expensive for them, the price-sensitive strategy worked as intended. But for the segment who prefer to go for a pizza buffet, the strategy backfired because the consumers compensate for the increase in price with increased consumption.

Giving people choices such as dietary options offered by the UK Eatwell Guide might work differently for different

segments. It was observed that older adults prefer less choice than younger adults (28). The challenge going forward it how can we design better, smarter choices for different segments of the population.

Health promoters need to think more from the angle of the people and design good health experience with them. Taking reference from the design thinking process (29), health promoters need to assume the beginner's mindset, don't assume the "experts" have all the answers. Be empathetic toward the target segment's needs. And don't settle for the middle-ground, average solution. Learn from the extremes, especially the "positive deviants" who are already performing the desired behavior to a very high degree. They might provide important insights.

CONCLUSION: AGING IN PLACE IN THE 21ST CENTURY

The world is aging, and with aging the burden of non-communicable diseases will be a serious issue that needs to be tackled. A hospital-based healthcare system will not be able to handle patient's long term care needs. In the 21st century, society needs to think about how to take care of the aging population in the community, in people's own home, and away from the hospital. That is, aging in place.

"Aging in place", is a more effective model which adopts a more proactive preventive approach to reduce people's chance of ill-health, in a more supportive environment not only the built and social environment, but also the choice environment should be carefully designed and constructed. The aim is to enable good choices and user experiences for people so they are more likely to perform the desired behaviors. Ultimately, the future for managing NCD in an aging society is how to improve the wellbeing and quality of life of the population.

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Prof. E.K. Yeoh

E. K. Yeoh is Professor of Public Health, Director at the JC School of Public Health and Primary Care of the Chinese University of Hong Kong (CUHK) and also Head of Division of Health System, Policy and Management at the JC School of Public Health and Primary Care. His research is in health systems, services and policy with an interest in applying systems thinking in studying how the complex components of health systems interact and interrelate to improve health. Prior to joining CUHK, Professor Yeoh was Secretary for Health, Welfare and Food of the Government of the HKSAR. From 1990 – 1999, Professor Yeoh was head of the Hong Kong Hospital Authority with the responsibility of the management and transformation of the public hospital system.

Dr. LANCELOT W.H MUI

Dr. Lancelot W. H. Mui is a Lecturer at the JC School of Public Health and Primary Care, Faculty of Medicine, The Chinese University of Hong Kong. Dr. Mui is very active in health promotion education in Hong Kong SAR. He led the curriculum development of the pioneer undergraduate program in Hong Kong for training of community health practitioners. Ever since the program's launch in 2013, he has been heavily involved in the teaching and training of this new workforce. Prior to the current role, he was the program coordinator for the Master of Science in Health Education Program at The Chinese University of Hong Kong. His current interests include the application of social marketing and design thinking in health promotion.

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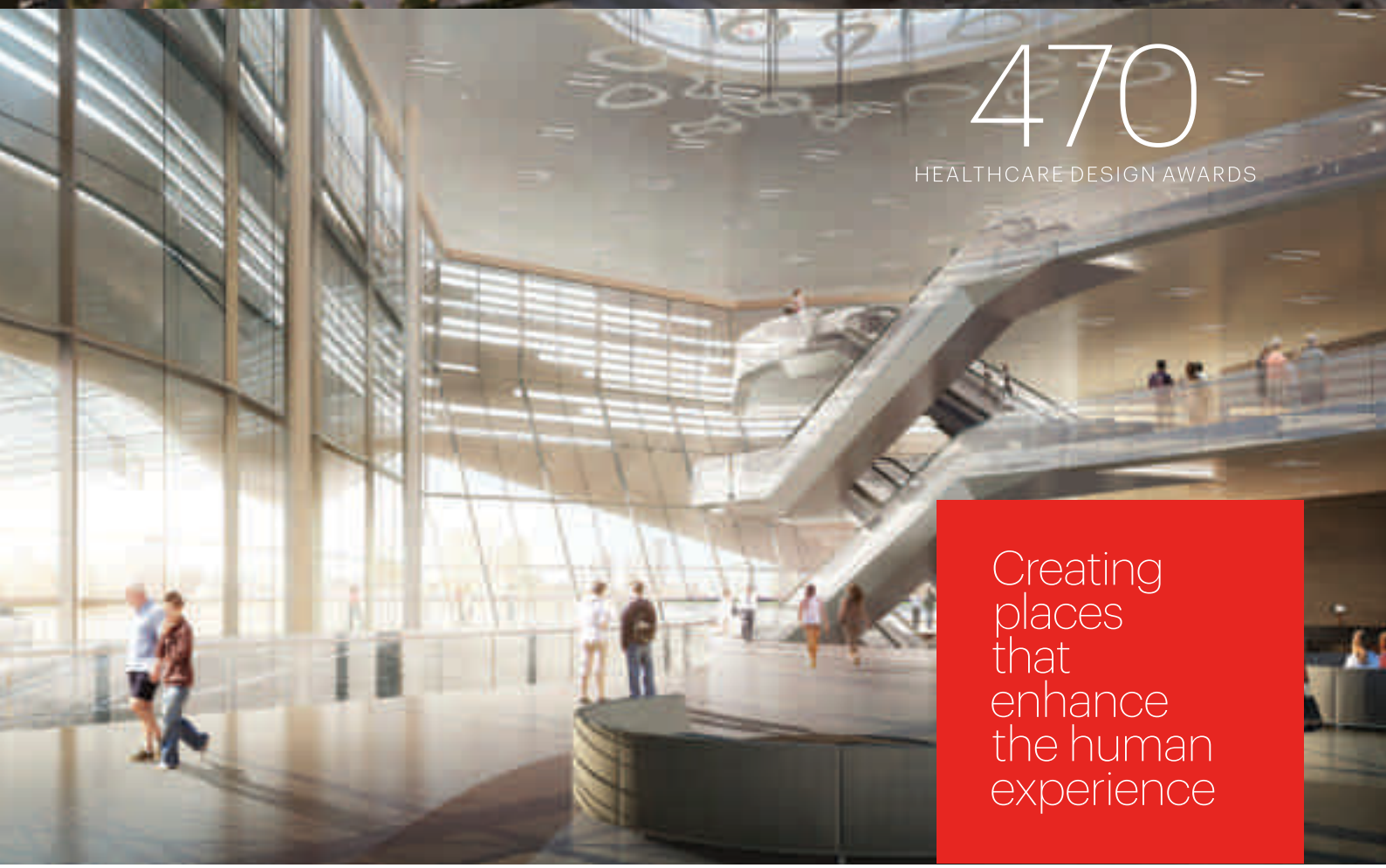

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A Multi-Method Study of Basic Design Principles for Hospital Staff Break Areas

Adeleh Nejati, Susan D. Rodiek, Mardelle M. Shepley, James W. Varni, Chanam Lee

Nurses are extremely important to the healthcare industry, and maintaining the quality of nursing care is a central concern for healthcare administrators. While healthcare leaders are concerned about improving nurses' satisfaction, performance, and job retention, they may overlook the importance of respite for nurses, and underestimate the value of designing staff break areas to maximize their restorative potential. The study investigated the main challenges that prevent nursing staff from taking restorative breaks in healthcare facilities. It also examined the main restorative components of staff break areas in healthcare facilities, by assessing usage patterns, verbal/visual preferences, and perceived restorative qualities of specific design features found in break areas for hospital staff. A multi-method approach combined qualitative explorations (focused interviews and narrative survey questions) with quantitative measurements (discrete survey questions and a visual ranking of break-room spaces); results were compared and triangulated. It was found that staff break areas are more likely to be used if they are in close proximity to nurses' work areas, if they have complete privacy from patients and families, and if they provide opportunities for individual privacy as well as socialization with co-workers. Having physical access to private outdoor spaces (e.g., balconies or porches) was shown to have significantly greater perceived restorative potential, in comparison with window views, artwork, or indoor plants. The results of this empirical study support the conclusion that improvements in the restorative quality of break areas may significantly improve nurses' satisfaction and stress reduction, potentially leading to improved care for the patients they serve.

Keywords: Nurse, Fatigue, Rest Break, Policy, Break Spaces, Built Environment, Health, Quality of Care

BACKGROUND

One of the central concerns of current healthcare research is how the needs of nursing staff can be better incorporated into the design of hospital environments. The healthcare industry is currently facing major challenges such as a growing shortage of nursing staff, the aging composition of the profession, and the imminent retirement of the "old guard" of registered nurses (Health Resources and Services Administration, 2013; Rosseter, 2014). Health facilities have also been suffering from a high staff turnover rate, which according to one study averages as much as 14% for bedside and 24% for medical-surgical nurses per year (NSI Nursing Solutions Inc., 2014). Job dissatisfaction, work-related stress, staff burnout and fatigue, and the quality of working environments were found to be factors that affected nurses' decisions to leave the profession (AMN Healthcare, 2012; McHugh, Kutney-Lee, Cimiotti, Sloane, & Aiken, 2011). Some of the reasons for the fatigue and exhaustion experienced by nurses are their extended hours, consecutive working shifts, insufficient sleep, long travel/walking distances, and a lack of rest breaks during shifts (Hendrich et al., 2008; Rogers & Hughes, 2008).

Healthcare facilities are ranked among the most stressful contemporary work environments for their employees; this is especially true for nurses (Tummers, Janssen, Landeweerd, & Houkes, 2001). While there is a substantial need for healthcare facilities to improve the experience of nursing staff by implementing new employment policies, the architectural aspects of the working environment can also contribute, either negatively or positively, to staff satisfaction levels. Although stress reduction and physical/psychological restoration have been found to be important in workplace environments (Nurit & Michal, 2003), healthcare facilities are often reported to lack supportive break policies, and to lack stress-reducing, restorative break rooms (Peck, 2010; Witkoski & Dickson, 2010). The resulting burnout and fatigue among nursing staff can often lead to a lack of focus and concentration, which can have drastic consequences not only for the staff members themselves, but also for patient outcomes (Wagner-Raphael, Jason, & Ferrari, 1999; Witkoski & Dickson, 2010).

Meta-analysis studies show that extensive research has been done on the connection between patient care environments and patient outcomes (Chaudhury, Mahmood, & Valente, 2009; Ulrich et al., 2008). However, there is very little data regarding the impact of healthcare facility design on the experiences and effectiveness of nursing staff (Rechel, Buchan, & McKee, 2009). In 2008, Ulrich and colleagues conducted an extensive literature review of rigorous empirical studies that linked design strategies or environmental interventions to healthcare outcomes. Their summary showed that only minor attention has been given to staff experiences and to staff-specific design factors. Furthermore, this review indicated a lack of evidence regarding the impact of staff-oriented environmental interventions.

In order to help mitigate this lack of evidence, the current study investigated the restorative potential of environmental aspects of break rooms, and evaluated specific design features. These features included the proximity of break rooms to work areas, levels of privacy, visual and physical access to the outdoors, the presence of artwork, plants, and daylight, and environmental amenities for indoor and outdoor break spaces. These break-room features were examined in regard to their perceived restorative qualities and their potential to affect staff usage, preferences, and satisfaction.

METHODS

A multi-method approach was used, including both qualitative and quantitative methods. Qualitative methods (focused interviews) were used during the early phases of the study, in order to provide insight and bring a sense of order to the complexities of the research topic. Quantitative methods (written surveys and visual assessments) were then used to investigate more specific hypotheses among a larger population sample and with greater objectivity.

Interviews

Focused interviews are one of the most powerful methods available for achieving comprehensive, in-depth insight into complex human behaviors (Lincoln & Guba, 1985; Zeisel, 2006). Based on the study's conceptual framework, an interview questionnaire was designed with ten open-ended questions to develop an initial understanding of (a) how nursing staff felt about their break areas; (b) how they defined their environmental needs and preferences; (c) what they considered important about taking rest breaks; and (d) what environmental features would meet their needs in break areas. Interviews were conducted with ten nurses who had previously been in clinical practice, but who were working in the healthcare design and construction industry at the time of data collection.

Written Surveys

Surveys are one of the most powerful and reliable research methods used in the social sciences. They provide a quick, effective, and inexpensive means of gathering large amounts of data, both qualitative and quantitative (Zeisel, 2006). The survey instrument included a total of 50 questions, both open- and closed-ended, divided into six major sections: 1) Demographic information; 2) Work environment and experience; 3) Rest break patterns; 4) Quality of staff break areas; 5) Future staff break areas; and 6) Additional feedback. A national professional organization, the Academy of Medical-Surgical Nurses (AMSN), agreed to assist in this study by sending the survey link to their members; they included the survey link on their website and in their electronic newsletter, which disseminated information about the online survey to their entire membership of more than 10,000 nurses.

Visual assessments

Human beings interact with their surrounding environments using multisensory information, but the predominant source of input in most situations is the sense of sight. In the current study, photos of actual staff break rooms/areas were taken at a convenience sample of healthcare facilities in Texas. Two photos were selected to represent two different but common types of break room conditions. The original images were modified using Photoshop CS6 editing software, to create five versions of each image; all were identical except for the digital addition or removal of specific environmental features (see Figures 1 and 2). Participants were asked to evaluate both sets of images on a scale of 0 to 10, stating how effective they thought the portrayed environment would be in relieving stress and helping them to feel more refreshed.

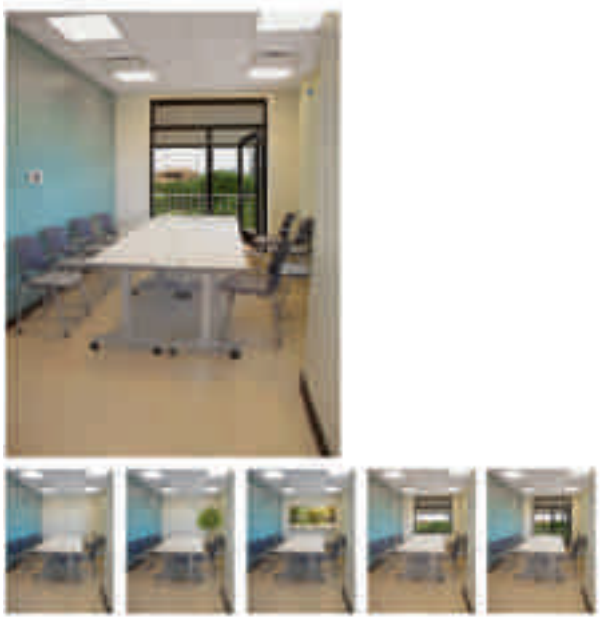

Figure 1. First Set of Visual Assessments: Original Image, Followed by Variations with Indoor Plant, Nature Art, Window, and Balcony, with Enlarged Example

Figure 2. Second Set of Visual Assessments: Original Image, Followed by Variations with Indoor Plant, Nature Art, Window, and Balcony, with Enlarged Example

RESULTS

Interviews

All the interviewees were female and between the ages of 50 and 65. Geographically, they represented nine different states in the U.S., distributed throughout the country. The study participants endorsed the value of environmental design in shaping human experience and ultimately supporting a healthier way of living. Discussing the issue of fatigue and burnout, one of the nurses noted, "I don't think we're going to solve a lot of these pernicious problems until we more fully understand the built environment, because literally the built environment shapes every single healthcare experience and the team who's caring for those patients." The interviewees also indicated that facility managers tend to place a much greater emphasis on the environmental design of patient and family spaces than they do on staff areas, even though managers may be aware that better design can reduce staff stress and enhance staff wellbeing. As one of the nurses stated, "one of the issues that I find, [is that] we've created these great spaces for patients and families and sometimes it is to the detriment of the spaces that we give staff."

Proximity of Break Areas to Work Areas

The interviewees repeatedly addressed the issue of where indoor and outdoor break areas should be located in relation to patient-care spaces. Six out of the ten interviewees cited proximity as a major challenge preventing nurses from taking regular rest breaks. For example, one of the nurses noted, "If they're not able to have immediate access back to the unit, like if the break room is not on the unit, then often times they won't take breaks."

Privacy and Tranquility

The interviews indicated that nurses need opportunities for privacy and serenity in their break areas. Participants frequently highlighted the need for personal space that was separated from patients and families. They suggested that break areas should be configured in way that allows for completely private individual time, as well as for opportunities to socialize with other staff if desired. For the latter purpose, being able to sit and eat in small groups was highly valued. One of the interviewees noted, "I think they need complete privacy because it is part of your decompression time . . . they [also] need a lot of privacy because it is patient information shared."

Visual and Physical Access to the Outdoors

As was noted earlier, the interviewees characterized the experience of working as a nurse, particularly in inpatient settings, as requiring a great deal of focus and intensity. The nurses often felt like they were living and working "in a bubble" without any connections to the outside world. The interviewees frequently noted that access to the outdoors can play a critical role in obtaining mental reprieve. One of the interviewees stated, "When I had a window it made all the difference in the quality of my day, being able to look at out and see what was going on." Another mentioned, "I think the access to a view or to daylight and to the changing of the time of the day and the seasons is critical to the mental health and well-being of the staff."

Access to Nature of Daylight

All the interviewees mentioned access to nature and daylight as preferred environmental amenities in their break rooms/areas. They stipulated that they could appreciate a wide range of different forms of contact with nature—ranging from indirect exposure via nature-related artwork, to the inclusion of indoor plants within their break areas, to a nice window view of mountains, gardens, and landscapes. However, participants reported that direct access to the outdoors was the most powerful stress reliever. For example, one participant described a highly-preferred staff break area, saying, "they had a beautiful staff lounge and it had a door that opens to a balcony, an outside balcony . . . just the ability to get fresh air, I think they would just love that."

Additional Amentities for Break Areas

Beyond the main components of break areas, the study participants described a variety of amenities that they would appreciate for enhancing their opportunities to rest. In regard to indoor break areas, the nurses repeatedly mentioned the value of comfortable furniture, appropriate appliances, and access to computers and Internet services. They frequently talked about nurses' need to "put their feet up" as a means of physical reprieve from long hours of standing and walking. They expressed a preference for comfortable furniture that is easily rearranged for individual and group activities. For

outdoor break areas, the three most commonly requested amenities were comfortable seating, covered patios, and a rich natural environment. One of the participants explained, "in my perfect world, there would be plants—not anything too crazy that requires a lot of maintenance. There would be a water feature that just gave that noise, that waterfall noise, and then benches to sit on. It doesn't have to be a big walking path because I just don't have time." Another requested, "trees, bushes, or flowers that have aroma to them; perhaps access to nature sounds [such as] running water or birds. I mean all of those elements of nature that we know nourish us as individuals."

Written Surveys

Study Sample Information

The link for the online survey and visual assessment was sent to 10,866 members of the Academy of Medical-Surgical Nurses (AMSN). The survey was open for a total of one month, with a total of 993 responses received. Estimated overall response rate is 9.14%. The study sample included 893 female nurses (94.3%) and 54 male nurses (5.7%). As expected, 51.5% of participants were older than 50 years old (See Table 1).

Table 1. Survey Demographic Information

	Frequency (N)	Percentage (%)
Gender		
Male	54	5.7%
Female	893	94.3%
Age		
< 24	10	1.0%
25-29	81	8.5%
30-34	67	7.0%
35-39	82	8.6%
40-44	94	9.8%
45-49	128	13.4%
50-54	176	18.4%
55-59	178	18.6%
60-64	110	11.5%
> 65	29	3.0%
Ethnicity		
Hispanic	46	4.8%
Non-Hispanic	903	95.2%
Race		
White/Caucasian	788	82.9%
Asian	71	7.5%
Black or African American	61	6.4%
American Indian or Alaska Native	4	.4%
Native Hawaiian or Other Pacific Islander	3	.3%
Other	23	2.4%
Level of Education		
Diploma-nursing	46	4.8%
Associate degree	159	16.6%
Baccalaureate degree	502	52.5%
Master's degree	225	23.5%
Doctoral degree	20	3.0%
Other	5	.5%

The survey data indicated that 84.7% of the respondents were working in inpatient environments. The vast majority of the survey participants were registered nurses (97.9%). In terms of their work positions, 63.6% were staff nurses, 12.3% were head nurses or unit managers, and 9.4% were educators. The majority worked day shifts only (63.3%), with a smaller but significant percentage working night shifts only (29.9%). The average duration of their working shifts was 10.7 hours (SD=1.80).The participants were asked to describe the level of stress in their work environments on a scale of 0 (low) to 10 (high). The average perceived stress level was 7.07 (SD=2.00). The majority (68.1%) rated their stress 7 or higher, with a smaller percentage rating it lower than 5 (see Figure 3). Participants were asked about the frequency and duration of their rest breaks. The average time allocated for a meal break was 27.70 minutes (SD=10.90), and the average time for a non-meal break was 7.06 minutes (SD=6.55). The total duration of rest breaks per shift averaged about 35 minutes (SD=16.07).

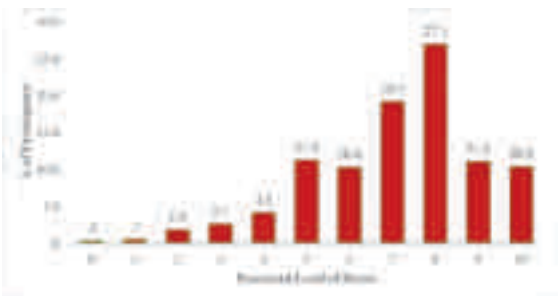

Figure 3: Perceived Level of Stress in the Work Environment

Staff Break Areas

In regard to where the survey participants preferred to take their breaks, the results indicated that staff break rooms located within the working unit were by far the most frequently selected locations. The nurses prioritized these rooms as their first choice for both meal breaks (55.0%) and non-meal breaks (47.9%). The cafeteria and work stations/ offices were the next-most-popular locations for meals.

Interestingly, outdoor spaces were given a relatively high priority as locations for short, non-meal breaks, rather than for longer meal breaks.

The vast majority of respondents (96.7%) had indoor break areas available for use within their healthcare facilities. The participants reported a significant lack of environmental features in their existing indoor break areas. Only 40.2% had windows, only 10.9% had any kind of artwork, and only a miniscule portion of these break areas had plants, music, or access to the outdoors (see Figure 4). Where windows did exist, the views most often consisted of buildings, signs, and traffic.

Figure 4: Environmental Amenities in Existing Indoor Break Areas

Only a small percentage of the respondents (22.9%) had any kind of outdoor break areas available for use at their healthcare facilities. Furthermore, 87.4% of the existing outdoor break areas were fully open to the public as well as staff. The respondents expressed dissatisfaction with this state of affairs, indicating a strong preference for separate, staff-only outdoor areas to provide adequate privacy away from patients and families (see Figure 5).

Figure 5: Privacy for Existing vs. Preferred Outdoor Break Spaces

Finally, when asked to report their overall level of satisfaction with their current break areas, the majority of the study participants expressed a distinct lack of enthusiasm. The majority were either unsatisfied or neutral in regard to both their indoor break areas (61.1%) and their outdoor break areas (53.3%). The indoor areas received consistently poorer ratings than did the outdoor spaces.

Hierarchial Multiple Regression Analyses

Break Minutes per Shift

A three-stage hierarchical multiple regression was conducted with break minutes per shift as the criterion variable. The three predictor increments included factors related to demographic, work settings, quality of break areas, and staff satisfaction with these spaces. In the first stage of the analysis, demographic factors were shown to contribute significantly to the regression model ($F[5, 266] = 2.93$, $p = .013$) and to account for 5.2% of the variation in total break minutes per shift. In the second stage, work-related factors were shown to explain an additional 6.9% of the variation in break minutes per shift, and this R^2 change was shown to be significant ($F[2, 264] = 10.39$, $p = .000$). In the third stage, the analysis indicated that environmental qualities of break spaces also contributed significantly to the regression model ($F[15, 249] = 2.19$, $p = .007$) and accounted for 10.3% of the variance in total break minutes per shift. More specifically, close proximity of non-meal break spaces (beta = .161, $p = .007$), having an outdoor space adjacent to break rooms/areas (beta = .237, $p = .031$), and staff satisfaction with their indoor break areas (beta = .232, $p = .021$) were among the significant predictor variables in this increment. Together, the variables considered in this analysis significantly accounted for 22.4% of the variance in total break minutes per shift.

Satisfaction with Indoor Break Areas

A three-stage hierarchical multiple regression was conducted for the criterion variable of staff satisfaction with indoor break areas. The three predictor increments included factors related to break room conveniences/amenities, environmental features, and views to specific outdoor elements. In the first stage of the analysis, conveniences/amenities were shown to contribute significantly to the regression model ($F[15, 750] = 9.19$, $p = .000$) and to account for 15.5% of the variation in break-room satisfaction levels. In stage two, the environmental features of the break room were shown to explain an additional 7.0% of the variation in satisfaction, and this R^2 change was shown to be significant ($F[5, 745] = 13.47$, $p = .000$). Specifically, artworks (beta = .159, $p = .000$), windows (beta = .236, $p = .001$), and access to outdoor spaces (beta = .104, $p = .002$) were significant predictor variables in this increment, while the presence of indoor plants was not. In the third stage, views to outdoor environments were also shown to contribute significantly to the regression model ($F[7, 738] = 4.84$, $p = .000$), accounting for 3.4% of the variance in nurses' satisfaction with their break spaces. Interestingly, a view of trees was found to be the most significant predictor variable in this increment (beta = .178, $p = .001$), while views of lawns, flowers, and park-like areas were not shown to be significant predictors. Together the variables considered in this analysis significantly accounted for 25.9% of the variance in nurses' satisfaction with their indoor break areas.

Satisfaction with Outdoor Break Areas

A two-stage hierarchical multiple regression was conducted for the criterion variable of staff satisfaction with outdoor break areas. Space configurations and environmental amenities were entered in two different predictor increments.

In the first stage of the analysis, space configurations were shown to contribute significantly to the regression model (F[5, 583] = 8.28, p = .000) and to account for 6.6% of the variation in nurses' satisfaction with outdoor break areas. The presence of courtyards (beta = .099, p = .034), viewing gardens (beta = .102, p = .016), and healing gardens (beta = .146, p = .001) were some of the significant predictor variables in this increment. In the second stage the analysis indicated that environmental amenities explained an additional 5.0% of the variation in satisfaction, and that this R^2 change was significant (F[10, 573] = 3.22, p = .000). Walkways (beta = .139, p = .036) and water features (beta = .111, p = .032) were the two most significant individual predictor variables. Together, the variables considered in this analysis significantly accounted for 11.6% of the variance in nurses' satisfaction with outdoor break areas.

Visual Assessments

The participants were asked to evaluate two sets of visual images (see Figures 1 and 2 in the Methods section), stating how effective they thought the portrayed environment would be in relieving stress and helping them to feel more refreshed, compared with the other images in the same set. Rooms with physical access to the outdoors (balconies) were given the highest ratings for restorative qualities (the average rating for balconies was 7.81 in Set 1, and 8.12 in Set 2). The original break rooms, without any added amenities, were given the lowest ratings (1.45 in Set 1, and 2.64 in Set 2). The average room ratings increased systematically, from no added amenities, to indoor plants, to nature artwork, to window views, to balconies. In addition, ratings for Set 2 images were consistently higher than those for the corresponding Set 1 images (see Figure 6).

Figure 6: Comparison of Visual Assessment Sets 1 and 2

A one-way analysis of variance (ANOVA) was conducted within each set of images to compare participants' ratings for various design interventions. The results indicated that in both sets, each design intervention had a significant effect on the perceived restorative qualities of the break room (Set 1: [F(4, 3877) = 1158.39, p = 0.000], Set 2: [F(4, 3688) = 892.54, p = 0.000]). In addition, post-hoc comparisons using Tukey's HSD test indicated that the mean scores among all of the design interventions were significantly different in both image sets. The smallest difference in perceived restorative qualities in both sets was between the presence of an indoor plant and the presence of a nature artwork (Set 1 = 1.26, p = 0.000; Set 2 = 0.96, p = 0.000). The largest difference was between the original break areas and the presence of a balcony (Set 1 = 6.36, p = 0.000; Set 2 = 5.48, p = 0.000).

DISCUSSION

The empirical data collected during this study provides new knowledge that can help nurses, facility designers, and healthcare managers in their efforts to improve the quality of restorative breaks. The results support the proposition that specific environmental characteristics are potentially important for reducing fatigue among nursing staff, and this section presents specific policy and design interventions that can help to make nurses' break times more effective.

Proximity - Locating Break Areas Near Patients

Both indoor and outdoor break areas should be located in close proximity to patient-care areas. This was found to be one of the most important design principles to encourage nurses to take more restorative breaks. Nurses are responsible for human lives, and they tend to worry constantly about their patients. If break spaces are located too far away from patients then nurses may feel like they are abandoning their human responsibilities by seeking a reprieve. Furthermore, with limited time available for breaks, having a greater travel distance to break areas tends to reduce the likelihood that they will be used. The study data indicated that the distant location of break areas was one of the primary barriers currently preventing nurses from enjoying regular rest. As one of the interviewees noted: "If they are not able to have immediate access back to the unit, often times they won't take breaks." This finding confirms previous studies showing higher levels of usage for break areas that are closer to work environments in healthcare facilities (Faris, Stigsdotter, Lottrup, & Nilsson, 2012; Sherman, Varni, Ulrich, & Malcarne, 2005).

The issue of proximity is particularly important for outdoor break areas, which are more difficult to position near medical units. This study results suggest that typical designs, such as centralized healing gardens located far from the inpatient care areas, are not likely to be used by nurses on a regular basis regular basis and may not provide enough privacy. These findings are consistent with previous studies indicating that in many cases, nurses did not even know about the existence of break spaces that were located far away from their work areas (Naderi & Shin, 2007). Based on an extensive study on workplace greenery, Lottrup (2012) also identified proximity to work areas as a critical design principle for constructing health-promoting outdoor break environments.

Privacy and Tranquility - Designing Secluded Break Areas

Break areas should provide nurses with complete privacy from patients and their families. The study results indicated

that this privacy was a central concern for two reasons, (a) the need for personal alone-time and tranquility, and (b) the need to freely socialize and to share confidential information with other nurses. In designing staff break areas, locations and configurations should be selected to offer opportunities for both individual privacy and small-group interaction. Several of the interviewees suggested that one-person private respite areas would be a valuable addition to currently existing break spaces, in order to accommodate staff members who need to spend some time alone. The issue of privacy was also very important in regard to outdoor spaces, as survey respondents indicated that 87.4% of their existing outdoor break areas were open to the public. The respondents expressed a strong dissatisfaction with this state of affairs, indicating that greater privacy is needed if outdoor break areas are to have a restorative effect for nursing staff. These findings are in accordance with previous studies showing nurses' strong preference for privacy in their outdoor break areas (Faris, Stigsdotter, & Nilsson, 2012; Faris, Stigsdotter, Lottrup, & Nilsson, 2012; Naderi & Shin, 2007).

Visual vs. Physical Access to the Outdoors - Designing for Escape

Working in healthcare environments, particularly in inpatient settings, requires a great deal of focus and intense concentration. Interviewees perceived the inpatient setting as living and working "in a bubble" without any connections to the outside world. According to the study participants, restorative breaks should be an opportunity to temporarily disengage from this 'bubble-world' and reconnect with everything that is going on beyond the work environment. One of the nurses stated, "When I had a window it made all the difference in the quality of my day, being able to look at out and see what was going on." These findings are consistent with existing evidence showing the positive impact of windowed workplaces for job satisfaction, perceived quality of the physical working environment, and overall employment experience (Bringslimark et al., 2011; Farley & Veitch, 2001; Finnegan & Solomon, 1981). While acknowledging the value of windows, the interview participants indicated an even stronger preference for actual physical access to the outdoors. They noted the rejuvenating effects of being able to sit outside, to take a short walk in a garden, or to smell fresh air during their breaks. This finding is also compatible with previous qualitative studies showing the restorative value of direct physical access to nature (Kaplan & Kaplan, 1989; Nettleton, 1992; PricewaterhouseCoopers, 2004).

The survey results showed that windows and accessible outdoor spaces were significantly associated with higher levels of staff satisfaction. These findings are consistent with the existing evidence showing that window views to nature and direct access to outdoor gardens substantially reduced staff stress and improved their alertness and productivity (Faris, Stigsdotter, Lottrup, & Nilsson, 2012; Pati, Harvey, Barach, 2008). One of the central concerns in the visual assessment part of the study was to determine if nurses responded more positively to images of a break room with direct physical access to the outdoors (via a balcony), in comparison to images of the same break room with window views but no direct access. The results showed that physical access to the outdoors was perceived to add significantly more restorative value (Set1 = 7.81, Set2 = 8.12) when compared to window views (Set1 = 5.90, Set2 = 6.49). These findings are consistent with existing evidence showing that outdoor nature contact was more effective in reducing stress and improving general health than was indoor or indirect nature contact (Largo-Wight et al., 2011; Lottrup, Grahan, & Stiggsdotter, 2012).

Access to Nature and Daylight - Incorporating the Outdoors

Considering the well-documented benefits of nature contact and daylight in relieving stress (Boyce, Hunter, & Howlett, 2003; Grinde & Patil, 2009; Ulrich et al., 2008), the study was designed to test whether or not these factors would be perceived by nurses as adding significant restorative benefits to staff break areas. The qualitative findings revealed that nurses expressed an interest in incorporating a wide range of natural elements into their break spaces, ranging from indirect exposure via nature-related artworks, to the inclusion of indoor plants, to pleasant window views of mountains, gardens, and landscapes. The survey participants indicated that direct access to the outdoors was the most powerful stress reliever, but that other ways of incorporating natural elements into staff break areas could also be of benefit.

Analysis of the survey data showed that views to natural elements were significantly associated with higher levels of reported staff satisfaction. These findings are in accordance with previous studies in demonstrating the value of natural elements in the design of indoor and outdoor respite areas (Cooper Marcus, & Barnes, 1999; Rodiek & Lee, 2009; Tyson, 1998). In the visual assessment portion of the study, the results showed that break rooms with direct access to nature and daylight were ranked significantly higher. Indoor plants and nature artworks had lower restorative effects, in comparison to windows and balconies. The greater restorative value that nurses attributed to window views and direct access to the outdoors is consistent with the large body of existing literature on the merits of nature access and daylight in work environments (Golden et al., 2005; Kaplan, 1993; Kaplan, 2007; Leather, Pyrgas, Beale, & Lawrence, 1998; Pati, Harvey, & Barach, 2008; Shin, 2007).

Additional Amenities - Designing for Comfort

The study results indicated that the restorative qualities of nurses' break areas can be enhanced through the inclusion of specific amenities. One of the most highly valued break-room features that emerged during the interviews and surveys was the presence of comfortable furniture, extending beyond the traditional office seating. A

need to "put one's feet up" was repeatedly mentioned as a means of physical reprieve from long hours of standing and walking. To this end, the study participants emphasized the importance of including couches, reclining chairs, and similar items within the break-room environment. Other strongly preferred amenities included refrigerators with ample storage space and computers with Internet service. In regard to outdoor break areas, the three most commonly requested amenities were comfortable seating, covered patios, and a rich natural environment.

LIMITATIONS AND FURTHER RESEARCH

As with all research activities, this study has limitations. Because the study included nurses in the U.S. only, and did not proportionally represent different U.S. climate regions, the findings are not generalizable to all regions of the U.S. or to nurses working in other countries and other climate regions. Conducting similar studies in diverse regions with varied healthcare systems, climate conditions, and cultural backgrounds may lead to further insights about what break-area design interventions are most effective in specific contexts. Although interviewees were chosen because of their experience with design as well as nursing, interviewing only nurses working in design firms might have introduced perspective bias into the qualitative explorations of design features' restorative qualities. Involving a larger number of interviewees, and including nursing staff without design experience, may lead to a more complete understanding of effective design recommendations. Another limitation was the use of on-line surveys (the only feasible method for this nationwide survey) which might have limited those who were able to participate in the survey. The use of self-reported data might have compromised the reliability/accuracy of the data and introduced respondent biases. Future research might also use alternative methodologies such as direct observation and outcome-based measurements to investigate staff usage, preferences, and the effects of different break-related interventions.

CONCLUSION

The results of this empirical study support the conclusion that improvements in the creation of better-designed break areas, can be of significant benefit for nurses and the patients that they serve. The results indicate that in order to obtain the maximum benefit from their rest breaks, nurses need a balance in which they maintain a reasonable physical proximity to their patients while still obtaining a sense of privacy and mental reprieve. Connection to the outside world beyond the work environment can be extremely helpful in obtaining the needed sense of distance. Visual or physical access to the outdoors may provide a sense of escape from the job-related sources of stress and fatigue, as well as an opportunity for physical and mental distraction. The study participants also indicated a strong preference for access to nature, daylight, and fresh air, as beneficial aspects of restorative break spaces. Overall, the current research project provided new empirical evidence to the healthcare design community, in identifying restorative design features that can be implemented in hospital staff break rooms/areas. The enhanced restoration provided by better design is expected to foster nurses' health and wellbeing, and allow them to provide the best possible care for their patients.

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Adeleh Nejati

PhD, Assoc. AIA, EDAC

Is a recent graduate from the Center for Health Systems & Design at Texas A&M University. Her dissertation, "Evaluating Usage, Preferences, And Perceived Restorative Qualities Of Staff Break Areas In Healthcare Facilities," earned the IADH's 2015 Best PhD Research Project Award as well as the 2015 Joel Polsky Academic Achievement Award and 2016 Joel Polsky Prize from the American Society of Interior Designers Foundation. Nejati has joined HKS Architects as a full-time health care architect and design researcher to focus on integrating research into practice of health care architecture.

Susan Rodiek

Ph.D. College of Architecture Texas A&M University

Dr. Susan Rodiek is an associate professor in the Department of Architecture at Texas A&M University, and a Fellow in the Center for Health Systems & Design. She is a nationally registered architect with over 25 years' experience in professional practice, research, and teaching. Her research emphasizes quality of life in design for aging and healthcare environments, with a focus on access to nature and the benefits of outdoor space in promoting health.

Mardelle McCuskey Shepley

B.A., M.Arch., M.A., D.Arch

is a professor in the Department of Design and Environmental Analysis and associate director of the Healthy Futures Institute at Cornell University. She is a fellow in the American Institute of Architects and the American College of Healthcare Architects. Dr. Shepley's most recent books are Health Facility Evaluation for Design Practitioners (2010) and Design for Pediatric and Neonatal Critical Care (2014). To enhance the link between research and practice, Dr. Shepley has worked in professional practice for 25 years. She is founder of ART+Science, design research consultants.

James W. Varni

Ph.D. College of Architecture Texas A&M University

Dr. Varni is a Fellow of the American Psychological Association and the Society of Pediatric Psychology, and has published over 300 peer-reviewed journal articles in behavioral medicine, and four books on children and families. He is a recipient of the Significant Research Contributions Award from the American Psychological Association. His areas of expertise are measurement instrument development and conceptual models in pediatric chronic health conditions.

Chanam Lee

Ph.D. College of Architecture Texas A&M University

Dr. Chanam Lee is a Professor of Landscape Architecture and Urban Planning in the College of Architecture at Texas A&M University. She currently directs a research group, Design Research for Active Living, devoted to interdisciplinary research aimed at linking elements of the built environment with health behaviors and outcomes. She is a fellow in the Center for Health Systems and Design, and adjunct faculty with the Department of Social and Behavioral Health.

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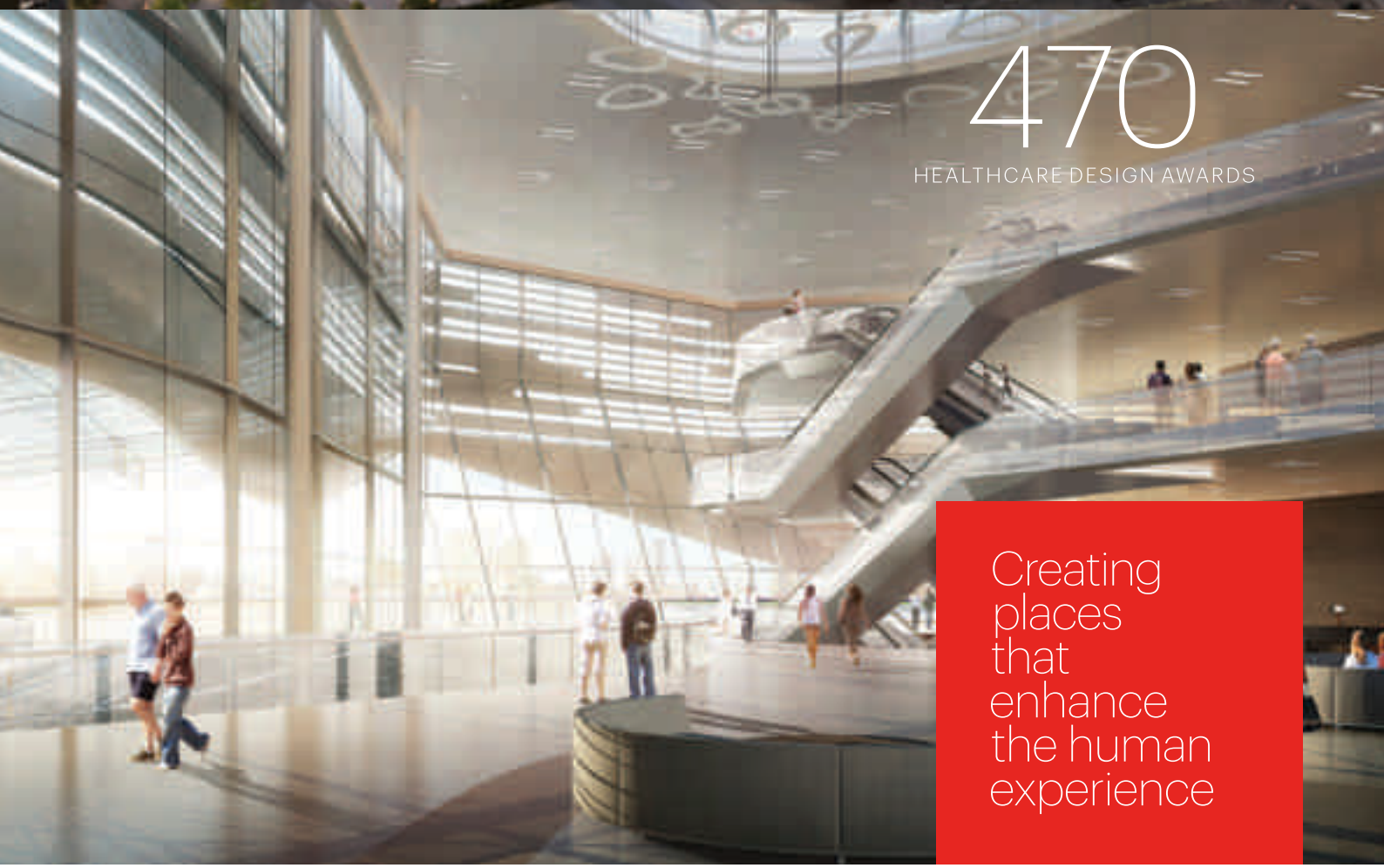

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UT Southwestern Builds Future of Medicine with the William P. Clements Jr. University Hospital

CallisonRTKL provided multiple services to UTSW and their new state-of-the-art teaching facility.

The William P. Clements Jr. University Hospital at UT Southwestern (UTSW) Medical Center is a new 1.3 million square-foot, high-profile academic hospital for UT Southwestern Medical Center, one of the country's leading academic medical centers, patient-care providers, and research institutions.

Initially in 2007, UTSW retained CallisonRTKL to plan and design an expansion of St. Paul University Hospital. The medical center purchased St. Paul University Hospital in 2000, and the fast-paced growth of the UTSW program made the expansion a top priority. It was to include a new 285-bed patient tower, emergency department, and diagnostic/treatment platform. Since the proposed expansion was so large and included most major hospital functions, the idea of building a new replacement hospital on a nearby 34-acre site became a reasonable possibility. Further study indicated that the cost of building a new state-of-the-art facility would approximately equal the cost of maintaining and expanding the 1963 St. Paul University Hospital. To continue building the future of medicine, UTSW decided to construct a new hospital, the William P. Clements Jr. University Hospital, to replace the aging St. Paul University Hospital.

With enhanced patient care as the driver for design and innovation, UTSW tasked CallisonRTKL with designing a state-of-the-art facility that utilized the most advanced technology and medical equipment. CallisonRTKL's design of the new, freestanding, 12-story hospital includes 460-beds, 24 operating rooms, a 40-bed emergency department, and 12 Cath/Interventional labs. CallisonRTKL provided master planning, architecture, interior design, operational modeling and simulation, medical equipment planning, and technology systems design services.

FUNCTION DRIVES THE SHAPE OF DESIGN

CallisonRTKL master planned the replacement hospital site to eventually accommodate clinical inpatient facility growth up to a 720-bed hospital, with appropriate parking garages and support. From the beginning, various approaches to the master plan were evaluated.

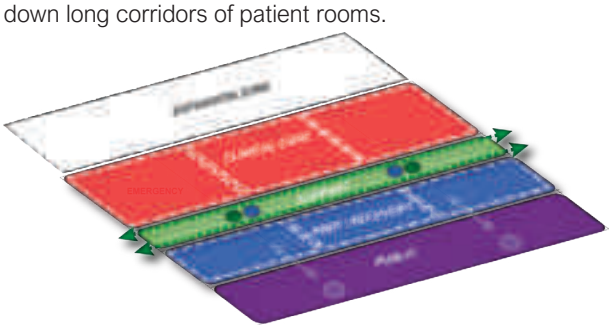
"W-shaped" Patient Bed Tower

Every element of the new hospital's architecture from operating and procedure rooms to patient rooms, was designed to ensure a collaborative approach to each patient's care. During schematic design, several configurations for the building were explored. The patient bed tower was especially scrutinized to achieve optimal function while maintaining an ideal solar orientation. A basic linear scheme was explored first. In search of a solution that fit the scale and context of the site, a number of alternate geometrical shapes were studied. In order to meet the above parameters, as well as maximize the patient views, a final "W-shaped" plan received consensus approval from the owner. Function drove the shape of the design.

The hospital's "W-shaped" design is distinctive and functional. This key architectural feature improves navigation, gives clinicians closer interactions with patients, promotes collaboration by collocating medical specialties and minimizes patient exposure to noise and infections. Dispersed workstations place nurses in close proximity to their patients; research areas on each patient floor integrate clinician scientists into patient care teams; and teaching spaces provide areas for healthcare teams to collaborate.

The "W-shaped" plan allows for efficient groupings of patient rooms, unobstructed patient views, and minimal solar heat gain while integrating to the existing scale and directionality of the surrounding campus.

Shorter hallways resulted from the "W-shape," which reduced the distance that caregivers must walk to perform tasks. Operational simulations were studied, demonstrating that nurses typically walk more than six miles a day in a traditional facility. Less time walking means more time spent with patients, and the shorter hallways create the ability to get to patients faster when needed. Shorter hallways also protect patient privacy and are appreciated by visitors. With fewer rooms to walk by, visitors will not feel as if they are trespassing or imposing as they often do when walking down long corridors of patient rooms.



Organization of the Diagnostic/Treatment "Plinth"

A whole, separate mechanical support zone is implemented in the center of the hospital and prevents mechanical equipment from encroaching on the functional space. At the front of the hospital is the public zone, which is separate from the support and material flow. The first touch point is the registration area and lobby, and then additional space is available offering: dining, retail, gift shop, grab-n-go shop, retail pharmacy and an education center where families can perform self-directed medical research. Visitors never need to go further into the hospital unless they are escorted. In the public zone, a large expanse of glass runs along the front of the hospital, allowing visitors and patients to remain oriented in order to help ease wayfinding.

CONSIDERING HEAT AND WIND

Like the sun, the wind can be both beneficial and detrimental to a built environment. Even in Dallas, where the unforgiving heat of summer can make the outside environment inhospitable, a cool breeze can extend the comfort season of an outdoor space by several months. However, in winter months, strong winds approaching a building can create an uncomfortable wind vortex, especially at a building's entrance where pressure differentials between inside and outside can create disruptive gusts through the doorways. An analysis of the annual wind conditions in Dallas can assist in locating comfortable outdoor spaces as well as the ideal locations of building entrances.

Statistical weather data shows that in the summer, the prevailing winds almost always blow from the south. This southerly breeze can be consistently used to cool an outdoor space on the east or west side of the building, especially if coupled with shade and/or a water feature along the southern edge to promote evaporative cooling. The south side of the building would be subject to wind vortex conditions while the north side would be subject to dead zones, with no consistent breeze. In the winter, the prevailing winds shift from north to south inconsistently. To avoid a turbulent wind vortex condition at the building entrance, a western or eastern location would be ideal. Taking advantage of the shading conditions created by the building itself, the eastern façade was determined to be the most ideal location for the main building entrance.

DESIGNING TO THE W-SHAPE

The "W-shape" evolved naturally from extensive discussion about what a modern hospital should provide, now and in the future, and what every hospitalized patient would want. In addition to the ideas and insights of all those who participated in the planning process, the discussions and decisions were informed by a series of site visits to hospitals around the country.

One of the most important tenets of hospital design is maintaining vital sightlines from the nurse stations to each and every patient room. By extending these crucial sightlines through the entire building, natural light and views can be brought to the nurses and patients who traverse the corridors day in and day out. This "light at the end of the tunnel" approach also serves to inhibit the institutional

UT Southwestern Medical Center's William P. Clements Jr. University Hospital in Dallas, TX

quality of these long corridors while assisting with wayfinding strategie Due to the expansive square footage, in order to break down the scale of the hospital, the patient bed floors were vertically separated from the rest of the building and positioned to rest over a horizontal base plinth which houses the diagnostic and treatment areas of the hospital, as well as many of the public spaces. This separation is further emphasized by the placement of mechanical spaces, which are sandwiched between the patient bed tower and the diagnostic and treatment base.

In order to further break down the scale of the patient bed tower, two parallel legs of the "W-shape" were articulated separately as solid tower masses, casting the other legs of the "W-shape" in shadow during much of the day. The remaining two segments of the "W-shape" remain as "connective tissues" that span between the towers.

By separating the building form into two distinct towers atop a common plinth, the hospital is experienced from the site and the approaching roadways as an orchestrated composition of smaller elements, instead of an overwhelming and unsophisticated mass.

Most hospitals are expanded upon over time in a series of incoherent and inconsistent additions and renovations. By anticipating this inevitable expansion, the hospital's identity can be maintained and even enhanced over time. In breaking down the scale of the building, twin towers were created. As the space needs of the hospital grow, a third identical tower can be accommodated on the site, thus creating a triple tower scheme. This triple tower scheme contributes to a cohesive campus while enhancing the iconic stature of the hospital.

Additionally, the rectilinear base was designed to anticipate expansion of the major diagnostic and treatment departments. With the exception of the unique public atrium, which remained the dynamic focal point of the composition throughout the expansion, the entire base is comprised of relatively simple orthogonal forms that can be added to in a modular fashion without disrupting the basic formal composition of the building.

Thoughts of ways to increase privacy and reduce noise were concentrated on. Thought was also given to public areas and lobbies, which are located outside patient units for security and noise control. In terms of day-to-day operations, one important goal was to reduce congested hallway traffic. Typically in hospitals, every hour is "rush hour." On patient care floors, busy caregivers are constantly taking supplies, meals, medications, and bulky medical equipment to patient rooms and nurse stations, all while patients are trying to rest and visitors are navigating the hallways searching for the room where their loved one is recuperating.

At the William P. Clements Jr. University Hospital, locating as much of this activity at the "back of the house" as possible meant designing dedicated elevators to bring materials directly into supply areas and eliminating the clutter and noise of supply carts rolling down hallways where patients and families walk. It also resulted in creating secured cabinets outside each room to house supplies and medications needed for each patient, and building in documentation areas outside each patient room that allow nurses to remain closer to their patients while keeping charts current.

The "W-shaped" design made it possible to create patient care floors that offer a quieter and cleaner environment, since the design allowed many routine functions, involving supplies, meals, and medications, to be located "behind the scenes." This design element prevents visitors from seeing or hearing "behind-the-scenes" delivery, provisioning and preparation activity.

IMPROVING OPERATIONS THROUGH DISCRETE EVENT SIMULATION

The objective of simulating the William P. Clements Jr. University Hospital's Clinical Care processes was to evaluate the benefits and penalties of the "W" design versus the originally conceived "Rectilinear" design, and to test the implementation of a Nurse Server concept. The simulation performed had three primary results. First,

simulation confirmed that there were no travel distance or travel time penalties in adopting the "W" plan over the original "Rectilinear" plan. Secondly, it helped optimize the placement of Equipment Supply Rooms, the quantity and location of nursing stations, and the location of the Clean Supply/Medications rooms, based on the location effects of nurse travel times and distances in the "W" layout. Lastly, simulation examined the implementation of a Nurse Server concept, which would use decentralized clean supply/medications "closets" to minimize nurse travel time and distances. It was determined that Nurse Servers saved time for nurses and reduced the combined annual Full-Time Equivalent (FTE) expenses for nurses, as well as for Pharmacy, Patient Care Supply and Linen Technicians in all Clinical Care units combined by nearly $683,000.

During discussions regarding the clustering of services more closely to a central location along each "leg" of the "W's" four 16-bed units, concern was expressed about the adequacy of equipment storage areas. It was clear to CallisonRTKL's team that all equipment storage was desired to be in Equipment Storage Rooms and not cluttering or visible in the hallways. A simulation scenario was performed that clustered the Clean Supply/Medications Rooms, and the Equipment Storage Rooms also added one Equipment Storage Room per 32-bed unit, giving it a total of two. The results showed that 7.23 minutes per nursing position per 24-hour period were saved with this configuration.

"CallisonRTKL's Operational Excellence team provided timely, valuable, quantitative performance metrics about alternative design solutions," said Becky McCulley, Associate Vice President for Clinical Programs & Surgical Services at UTSW Medical Center.

The location of the Clean Supply/Medications Room was an important component of the CCPG's design concerns, since these areas are frequented often by nurses if there are no Nurse Servers. The Clean Supply/Medications Room on the one side of the "leg" was shifted toward the center of the "leg" and the operation of the 32-bed unit was simulated again in order to study this proposed feature. The results indicate a savings of 2.94 minutes per nursing position per day.

The Nurse Control Stations in Clinical Care were originally located at the two eastern "tips" of the "W," one centrally located for each of the two 32-bed units on a floor. Critical care had two Nurse Control Stations for each 32-bed unit, located toward the center of each 16-bed unit. The CCPG wanted to explore the effect on nursing efficiency of adopting a critical care approach. The amount of time saved by the revision averaged 4.79 minutes per nursing position for a 24-hour day considering all eight nurses, and 7.29 minutes for those nursing positions positively affected.

For the OR suite, a comprehensive, integrated simulation model tracked patients through Prep/Recovery, PACU and the OR itself. Simulation was performed for the facility's Operating Room suite layouts early in the design process to minimize surgeon travel time and distance. The simulation had four primary results. First, it validated that a dual-floor solution would result in less travel per day than surgeons face in the current environment. Simulation also evaluated the efficiency impact of alternative locations for the lounge and cross-corridors, in terms of surgeon travel time and distance. Although central locations would have reduced travel time and distance, the surgeons preferred a more remote lounge that featured natural light and exterior views. The OR suite was evaluated throughout capacity to ensure that the chosen layout would be able to accommodate projected patient volumes through the years 2015, 2020 and 2025, using the metrics of travel time, travel distance, and 70% room utilization.

The performed simulation showed that total throughput capacities were adequate. Finally, simulation provided the Central Sterile Processing unit with the number of instrument sets requiring processing by hour, and it documented the number of nurses and other staff types required by hour. These results served as aids in developing staffing models and projecting operational costs. In addition, Pre-Admission Testing processes were simulated to evaluate nurse utilization and future exam room capacity, which provided the number of staff needed through 2025 and proved that four exam rooms would be able to accommodate the patients even through the year 2025.

Simulation of the William P. Clements Jr. University Hospital's Material Management department was done to evaluate the impact of the service facility layout and the materials distribution technology, and processes on departmental efficiency. It was determined that a warehouse adjacent to the hospital did not require a significantly greater number of Full-Time Equivalents (FTEs) than an integrated warehouse embedded on the first floor of the hospital, therefore allowing savings on construction costs without increasing operational expenses. Simulation also determined that investing in a chute system for transporting waste and soiled linen would yield a shorter payback period than investing in Automated Guided Vehicles (AGVs), and that investing in both a chute and AGVs would actually increase that payback period. Thus, the recommended investment was first for a chute system, rather than for

AGVs. A chute-plus-AGV system was not recommended, because it decreases the efficiency of the AGVs.

The pharmacy was originally located on the north side of the second floor in the hospital design. As the design footprint evolved, a location on the south side of the second floor began to offer better integration into the overall Diagnostic and Treatment platform. Therefore, the simulation objective was to evaluate the impact of a south side Pharmacy site on pharmacy technician travel times and distances. Simulation results showed that a south side Pharmacy location would reduce pharmacy tech travel time by 25 minutes each day and reduce travel distance by 2,789 feet per day, relative to travel time and distance from the north Pharmacy location. These benefits allowed the design team to shift the Pharmacy to the south.

To evaluate the capacity of the dining room in the proposed floor plan, a distribution of group sizes was collected and the probability of each group size arriving was calculated. The table utilization simulation showed that less than 40% of the dining room is occupied at any time, even during peak hours. Based on historical, collected, and calculated inputs, simulation generated the customer's average waiting time before ordering at each location. This helped identify the most popular food locations, as well as determine whether more staff would be required to reduce unacceptable waiting times.

UTSW had separately engaged an elevator contractor to help them determine the number of elevator banks and cabs needed in the new facility. However, the health system was uncomfortable with the recommendations from the elevator contractor and utilized CallisonRTKL to verify whether the contractor's projections were valid. Data collection and analysis, as well as the testing of elevator capacity via Elevate 8 (a specified simulation software for elevator study). The simulation found that two banks of three, 3,500 pound, 500 FPM elevators would provide excellent service during peak demand periods. In addition, 700 FPM elevators will improve service by 15%, reducing the waiting interval by four to five seconds.

WORLD-CLASS TEACHING FACILITY

The William P. Clements Jr. University Hospital is seen as vital to UTSW's ability to recruit and retain top clinical leaders, to offer the best training, and to attract academic and industry innovators. CallisonRTKL's design tightly integrates the clinical, educational and research components into the patient care unit, an innovation that will help researchers and physicians work in teams near patients to advance healing.

UTSW is home to state-of-the-art research facilities, where small ideas can become big discoveries that help unravel medicine's deepest mysteries. To continue building the future of medicine, the new hospital brings the same level of innovation that drives its research accomplishments

Interactive Conference Room

More than 35,000 square-feet of space is dedicated to research and learning. Every patient floor supports clinical research with areas where patients, faculty, staff and others can participate in cutting-edge research projects. Conference rooms with interactive electronic whiteboard technology and videoconferencing capabilities enable care teams to gather and confer on cases with other experts at UTSW or anywhere in the world. A 10,000 square-foot education and conference center is included featuring a 150-person auditorium and two fixed, 50-person classrooms. The new patient floors offer touchdown spaces, rounding rooms, and virtual libraries. The touchdown spaces, or super alcoves, offer an area where a couple of physicians and a nurse can gather to discuss treatment options aided by a flat screen monitor with patient information. In addition to these breakaway spaces for caregivers, rounding rooms have been designed for physicians and residents to connect and review patient cases during their rounds. In the middle of these rooms, based on feedback from the physicians, CallisonRKTL installed "smart tables" that feature LCD projection and a touch screen.

The Patient and Family Resource Center, located just inside the main entrance to the hospital, is another area focused on education and research. Designed to provide patients and their families with access to the most up-to-date information and materials about the causes, treatments, and cures of diseases, the Center will also highlight UTSW's history of bench-to-bedside discoveries and therapies. The resources in this area were planned with guidance from the staff of the Perot Museum of Nature and Science in Dallas, and the consultants used to design the exhibits for that facility.

Through the creation of a world-class teaching facility, UTSW is able to attract and retain highly-skilled clinicians. UTSW also wanted to encourage their physician faculty

Patient Garden

members to be able to continue working while in the hospital versus travel back to their offices. CallisonRTKL designed collaboration spaces to act as a virtual library while providing a living room type area and a work space. On various patient floors, UTSW created simulation labs that are mock-up patient rooms complete with medical training mannequins for teaching and "hands on" training. The intent of these rooms is to encourage continued training and aide with nurse accreditations.

Research spaces on each patient floor integrate clinician scientists into patient care teams. Areas dedicated to clinical trials ensure access to lifesaving tests of promising new drugs and treatments for the patients who need them most. Teaching spaces provide areas for health care teams to collaborate on clinical treatments and care plans individualized to each patient. Combining function and aesthetics to push the boundaries of design, as well as science, advanced technology and equipment provide patients with access to the latest lifesaving interventions. The pathology lab is connected by live video to each of the hospital's 24 surgical suites, enabling pathologists and surgeons to view and discuss tissue specimens in real time while a surgical procedure is under way. The new hospital provides the foundation for an entirely new era of medicine which integrates research, education and patient care.

STATE-OF-THE-ART TECHNOLOGY

With enhanced patient care as the driver for design and innovation, UTSW tasked CallisonRTKL with designing a state-of-the-art facility that utilized the most advanced technology and medical equipment. CallisonRTKL's Healthcare Technology Group designed the infrastructure for medical communications, security systems, Closed Circuit Television, access control and panic alarms, audio visual systems, nurse call communications, Real-Time Locations Systems (RTLS), networking, wireless, and patient entertainment systems. A videoconferencing capability is available in all patient rooms to allow doctors to check in with their patients. Interactive flat-screen monitors are equipped with high-definition cameras, enabling patients to stay connected with family and friends. Surgeons have similar videoconferencing capabilities in the operating rooms, allowing real-time discussions with colleagues during surgery. In touchdown stations, touch screen displays are included to allow students and doctors to set up a presentation from their own portable device and present on the screen. Secure mobile devices enable physicians and nurses to maintain, track and share up-to-date electronic medical records. Radio frequency identification devices (RFID) and bar coding of equipment and medications promote proper tracking and administration, reducing the potential for errors. In addition, an interactive electronic whiteboard technology is located in nearly all teaching areas, enabling caregivers to view and make notation on X-rays, slides, and videos.

Operating Room

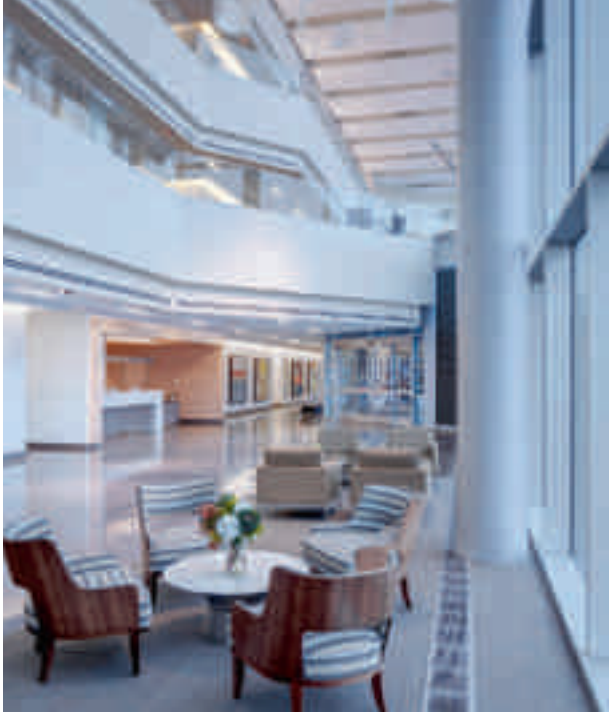
TIMELESS INTERIORS

The building functions are split with the lower floors (1-4) containing diagnostic, treatment, and building support spaces, and the upper floors (5-12) consisting primarily of inpatient unit spaces. Though departments are split from floor to floor, the interior environment is universally planned into three main categories of space including transitional, destination, and private spaces. This allows for design features, materiality, and purpose of space to be clearly defined and distinct.

The transitional spaces are the most public areas within the building in which all patients and visitors must pass through. These zones have high visibility and transparency within a large volume and therefore incorporate the use of bold architectural gestures and materials to provide visual wayfinding cues. The use of large windows provides daylight and a connection to nature, which can help alleviate the tension of an active environment. Additionally, the windows aid the orientation of visitors by visually connecting the interior setting to the exterior of the building.

Destination spaces within this facility include a wide range of amenities and functions for the staff, patients and visitors. Areas such as the Gift Shop, Dining Room, Patient Resource Center and family lounges are all framed architecturally with strong identification markers so they can be clearly recognized. These areas are more intimate in nature and are designed to offer comfort and a sense of retreat from the rest of the hospital. Therefore, lower ceilings are designed to create a comfortable volume of space with sound absorptive materials used to enhance acoustical privacy.

A timelessness approach was implemented toward the interior design and its features. The approach veered away from going off into trends and utilized more neutral



INNOVATION IN THE HEALTHCARE INDUSTRY

Careful planning of the patient room, specifically, marks a room design that provides patient comfort and safety and a secure environment for family and visitors, as well as a functional and efficient space for caregivers and physicians. Elements from nature promote healing and are a key component for the materiality, but in synthetic form, as infection control is of the highest priority for the surfaces within the patient room. Both natural and artificial lighting are purposefully composed into the patient environment so that many different lighting levels are available.

UT Southwestern Medical Center is one of the leading academic medical centers, patient-care providers and research institutions in the country, utilizing the latest medical technology. UTSW is committed to providing innovative education, research and care. With the design of the William P. Clements Jr. University Hospital, this facility was able to uphold and enhance this mission.

Gary Buss, Sr. Associate Vice President

Gary is a principal, project manager, communication systems designer, and the leader of CallisonRTKL's Technology Design Studio (TDS). Gary is responsible for all aspects of structured systems designs and technology integration solutions. As a Systems Designer, he leads project teams to design structured systems for all aspects of low voltage communication systems for today's complex healthcare design and construction projects. He ensures overall product quality, customer satisfaction and technical solutions leadership. He has been involved with several key healthcare projects and leading healthcare systems within the United States.

Mike Hoffmeyer, Sr. Associate Vice President

Mike's 40 years of practice have been devoted primarily to the management, planning, and design of healthcare and medical projects. Mike has served major teaching hospitals, community hospitals, and private practitioners. His project experience ranges from master facility plans to renovations to multi-million-dollar new construction projects. Mike has experience in all phases of architectural practice including space programming, project budgeting, functional planning, master facility planning, design development, construction documents, and construction administration.

Stan Parnell, Sr. Associate Vice President

Stan has spent his entire professional career in the healthcare industry. He started his career in the corporate design and construction department of one of the largest investor-owned hospital companies in the US. His owner's perspective and collaborative style form the foundation from which he shares his expertise. During his 40+ years in planning, design, technology planning and project management, he has worked on over 400 projects throughout the US, Europe, Middle East, Asia, and Central and South America.

Jorge Rodriguez, Associate Vice President

Jorge is a Project Manager/Project Architect for CallisonRTKL with over 20 years of experience in healthcare for technical design and the delivery process. Jorge is skilled at integrating consultants and contractors within the documentation process to effectively achieve constructible solutions that build consensus and expedite schedules. He has worked on construction administration phases of his projects and is highly regarded by his peers.

Jun Jia, Associate

Jun Jia received her master's degree in Industrial Engineering in 2006, and her doctorate degree in Industrial Engineering in December 2008. During her coursework and research at the University of Arkansas, she developed a strong aptitude in modeling, simulation, scheduling, and statistical applications. Through several projects, like Forced Transfer Busing for the Department of Transportation, University Transportation Centers Program and Cellar Tank Piping Network Analysis for E. & J. Gallo Winery, she gained experience with job scheduling on identical parallel machines.

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Chris Hani Baragwanath Hospital Main Entrance

The Role of Design Guidelines for Accident and Emergency Facilities (DGAEF) in South Africa

The update of the DGAEF can improve the design of accident and emergency (A&E) facilities, which is essential to the achievement of the right to healthcare services as provided for in the South African Constitution

Demand for healthcare in South Africa has increased dramatically since the first multi-racial democratic elections in 1994. There is, thus, urgent need to drastically improve healthcare services delivery. However, the design guidelines (DGs) for healthcare facilities development date to the apartheid era, the consequence of which is inadequate provision of healthcare facilities in urban areas where the poor black majority live and work.

The aim of this research is to assess the role of design guidelines for accident and emergency (A&E) facilities in South Africa so as to make recommendations on how to improve their design and project development process. This study, therefore, focuses on design guidelines for accident and emergency facilities (DGAEF) which have an important role to play in the achievement of equitable, efficient, effective, inclusive and responsive healthcare services delivery for all.

This paper discusses the research in A&E facilities conducted in South Africa between 2013 and 2015 using the following methodologies: questionnaire and interview surveys, floor plan analyses and observational studies. Informed and guided by philosophical and theoretical frameworks and a conceptual model of DGAEF and owing to geographical and time constraints, the study was restricted to two case study on accident and emergency (A&E) facilities in Gauteng Province—Chris Hani Baragwanath Hospital (CHBHSJ) in Soweto, Johannesburg in Figure 1.1 and Khayelitsha Hospital in Cape Town (KHCT) in Figure1.2.

The findings are that there is inadequate policy attention to the update of DGAEF; lack of integration of project vision into project brief, design and construction processes; excessive timeframes for project development; quality issues; and post- occupancy evaluation (POE). Thus, the findings underscore the need to develop and introduce design quality indicators (DQIs) and key performance indicators (KPIs) in the DGAEF used for space design and provision, functional suitability and spatial relationships.

MAIN QUESTIONS

The research questions listed below were thus formulated to address the overall aim and to guide the empirical research process. The research questions were developed through the following processes: a review of the literature on DGAEF; meetings with government officials, caregivers, healthcare facility design professionals; discussions with subject specialists; exploratory studies of similar healthcare facilities elsewhere in South Africa; and practice-based experience of the researcher:

1. Are DGAEF followed?
2. How effective and efficient are healthcare services delivered from A&E facilities?
3. What are the contributions of buildings towards effective and efficient A&E operations?

Healthcare facilities project development process

The healthcare facilities project development process includes: feasibility study, project brief, schematic design phase, design development phase, contract document phase, procurement, contract award, construction phase and pre-commissioning phase[1].

The appointment of the interdisciplinary project team at the front-end of the design process for healthcare facilities—"the preliminary, pre-project stages of the design and construction process" is essential to ensure that all stakeholders share the same project vision and goals[2]. The interdisciplinary project team—"a group of experts from multiple disciplines both within and outside of the healthcare system"—should ideally be constituted at the conception of the project based on the concept of "design and operational systems-based perspectives"[3,4].

Design guidelines

DGs are aimed at directing project planning, design, implementation and post occupancy evaluation (POE). They provide a framework of "principles, directions and guidance in the steps from goal-to-programme-to-design"[5]. And basically take the form of (i) behavioural or attitudinal statements; (ii) performance standards; or (iii) prescriptive guidelines.

Design guideliness domains

The main domains in the DGs are: domain of functions; domain of statutory requirements; domain of procurement and construction systems; and domain of technical performance[6]. These are summarised diagrammatically in Figure 1.2.

Domain of functions: Healthcare facility spaces are categorised into four main zones: Zone A (entrances, waiting and support facilities); Zone B (clinical areas); Zone C (nursing areas); and Zone D (living and supporting areas) [7, 8]. Traditionally each has had a specific functional focus, and has not been used for any other function. However, recently, owing to the recognised need for functional adaptability, patient/caregivers/community design approach and efficiency of space utilisation, healthcare facilities spaces are now being designed to be more flexible and adaptable for multiple-use[9]. More specifically, medical and nursing spaces in A&E facilities are being designed as universal spaces which can be easily adapted to fulfil multiple functions.

Domain of Statutory Requirements: Statutory guidance

Figure 1.1: Chris Hani Baragwanath Hospital Main Internal Courtyard

Figure 1.2: Khayelisha Hospital Main Entrance

Chris Hani Baragwanath Hospital Main Pedestrian Entrance

resources. The domain of statutory requirements thus focuses primarily on issues of legislation; technical and functional standards; safety regulations and project budgets[10].

Domain of Procurement and Construction Systems: The domain of procurement concerns project resources for healthcare facility development and is split into four sub-domains: traditional contracting; design and build; management based methods (management contract and construction management) and design and manage (consultant-based project management and contractor project management). Three key factors influence the choice of construction system—time, cost and quality[11].

Domain of Technical Performance: Criteria for benchmarking the technical performance of design solutions are a critical element of the DGs for healthcare facility development projects. They are especially important in initial discussion documents for the strategic planning approach, design process, project cost, construction methods and operational systems envisaged for the healthcare facility[12].

Design guideliness for A&E in South Africa

The above reasons led to the introduction of DGs for healthcare facilities in South Africa in 1970. This was through the appointment of a committee, led by T.L. Webb, to investigate the concept of area and cost norms and propose guidelines for project briefing, design, construction and commissioning of healthcare facilities in South Africa. In developing the area norms, the Webb Committee conducted studies of the existing local and overseas healthcare facilities, in particular in the United Kingdom (UK), Canada and Australia[13]. The studies mainly covered information on clinical areas, such as examination, treatment, and resuscitation areas and excluded, support areas like admissions, patient waiting, caregivers and other ancillary areas[14]. Table 1.1 illustrates the acceptable area range with a maximum limit beyond which expenditure would be needless and wastefuland a minimum limit below which adequate healthcare service delivery could not be provided efficiently and effectively[15].

The DGAEF provide an area linked to a 3-hour peak number of patients, which is 430 m^2 for the first 50 patients and 100 m2 for every additional 50 patients. They also recommend the provision of one treatment area for 1,100 attendees or one treatment area for 400 yearly admissions and also one resuscitation area for every 15,000 yearly admissions. While the three components of A&E facility space design have to be analysed to estimate the total number of examination and treatment rooms required, according to American College of Emergency Physician (ACEP) (2004) are: demand, peaks and actual time spent in the room for medical attention excluding waiting time. Using the ACEP guidelines, the estimated number of examination and treatment spaces should be calculated by multiplying the expected peak shift workload by the average room time and dividing this figure by eight hour staff shifts, with two more rooms added to the total for resuscitation spaces[16].

Definitions of design guidelines

Thus, the operational definition of DGs adopted for purposes of this study is:

" a set of principles and standards developed through research and practice-based evidence used for space design and provision, functional suitability, spatial relationships, and project development process for improved operational process and quality of healthcare services delivery."

It is clear from this definition that DGs need to be continuously updated to reflect new knowledge gained through research on their application in practice for healthcare facilities projects briefing, design, procurement, construction, and operation and maintenance.

Proposed conceptual framework for DG update

The theories and design philosophies behind healthcare facilities development from the early ages to date underscore the need to identify and explore methodologies for evaluating project development process tools, quality of the physical environment and perception (impact). Informed by the foregoing literature review, the conceptual framework proposed for this study identifies six significant conditions that influence and are influenced by the DGs update. The key concepts that make up the theoretical framework and operational context are:

(i) DGs as a medium of communication;
(ii) the influence of DGs on effective and efficient design of healthcare facilities;
(iii) introduction of participatory approach process in the DGs;
(iv) the importance of DGs on technology innovation;
(v) the role of DGs on institutional transformation; and
(vi) standardisation of the project implementation process and life-cycle costing.

These are illustrated in the proposed model of the conceptual framework for DGAEF update in Figure 1.6 below, and provide the basis for the empirical research, data analysis and discussions in the following sections.

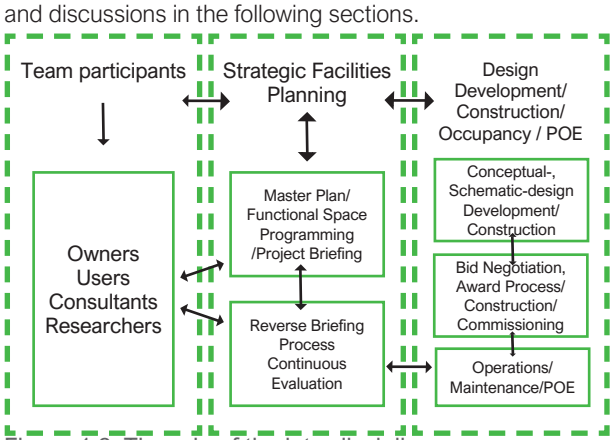

Figure 1.3: The role of the interdisciplinary team in the project development process

Table 1.1: Summary of revised (October 1987) DGAEF for the estimation of the planning units

A&E facility	Planning units (PU)	Space needs	Area based on DGs	Cost norm December 1979
• Emergency	• Patients in 3 hour peak period	• Determine likely number of emergency patients in a 3-hour peak period • Use outpatient design guidance where the number of patients is less than 60 during a 3-hour period	• 430 m2/60 patients plus 100 m2 for every additional 50 patients	• R 378/ m2

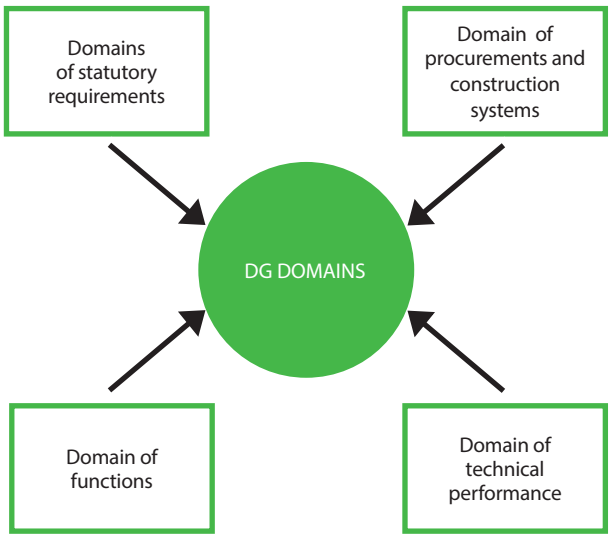

Figure 1.4: The key domains in the general and specific requirements in design guidelines

RESEARCH METHODS, DATA COLLECTION PROCESS AND ANALYSIS

Research methods:

The data collection process used a mixed-methods approach, involving qualitative and quantitative data collection methods to enable confirmation or corroboration through triangulation. This approach is essential to a comprehensive and reliable analysis of the phenomena under investigation.

Data collection process

The data collection phase was organised in three fieldwork phases. The first fieldwork undertaken in September 2013 was instrumental in determining the most appropriate setting for the research and in the decision-making process for data collection phase. In this phase, the researcher undertook a situation analysis of existing A&E facilities in Johannesburg and Cape Town with the aim of selecting those most appropriate for the study. The second fieldwork phase in January 2014 was a pilot study, during which preliminary informal interviews were held with these categories of respondents: consultants (architects and quantity surveyors), Gauteng and Western Cape Provincial Department of Health and Public Works staff, caregivers (doctors and nurses) and patients (who have been to CHBHSJ and KHCT A&E facilities). The third phase was organised to administer the questionnaires to the consultants, Gauteng and Western Cape Provincial Department of Health and Public Works staff, caregivers and patients identified for this study were also conducted.

A total of 31 of 60 planned interviews were successfully conducted. The interview data was used to, check, confirm and reinforce the findings from other methods used in the study.

The data collection approach for the floor plan analysis conducted during the observational studies used the key performance indicators (KPIs) developed by NHS (2001): baseline statistics; pattern of movement survey; space use occupancy survey. The floor plan analysis was undertaken to evaluate how the provided spaces are being used for healthcare services delivery and to assist the researcher to evaluate built environmental features that would improve or constrain the effectiveness and efficiency of the A&E facility daily operations.

Data analysis process

The information gathered from questionnaires was analysed using descriptive statistics. While the respective data collected from interviews and observational studies coded field-notes and other fieldwork protocol documents—observation location and times sheet; observation continuous interval recording sheet; and space use occupancy continuous interval recording sheet—were read thoroughly as required by the content analysis approach. Through this data analysis technique, the ideas, opinions, themes, issues or hidden assumption are extracted from the text.

Hierarchical Task Analysis (HTA), Link Analysis (LA), AutoCAD, and Space Syntax techniques were used for the analysis of the A&E floor plans on CHBHSJ and KHCT healthcare facilities workflow processes and operations as shown on Figures 1.7 and 1.8. This data analysis method was used to evaluate challenges facing A&E facilities such as wayfinding, patient privacy and dignity, long waiting times for patients and visitors and caregiver's surveillance of the waiting and other areas inside the department. A SWOT (Strength-Weaknesses-Opportunities-Threats) analysis was also conducted. Hence the key themes identified from the quantitative and qualitative data analysis were categorised into three main issues:

(i) Design tools: project brief document, design solutions, project management, and project programme;
(ii) Quality of the physical environment; and
(iii) Perceived perceptions.

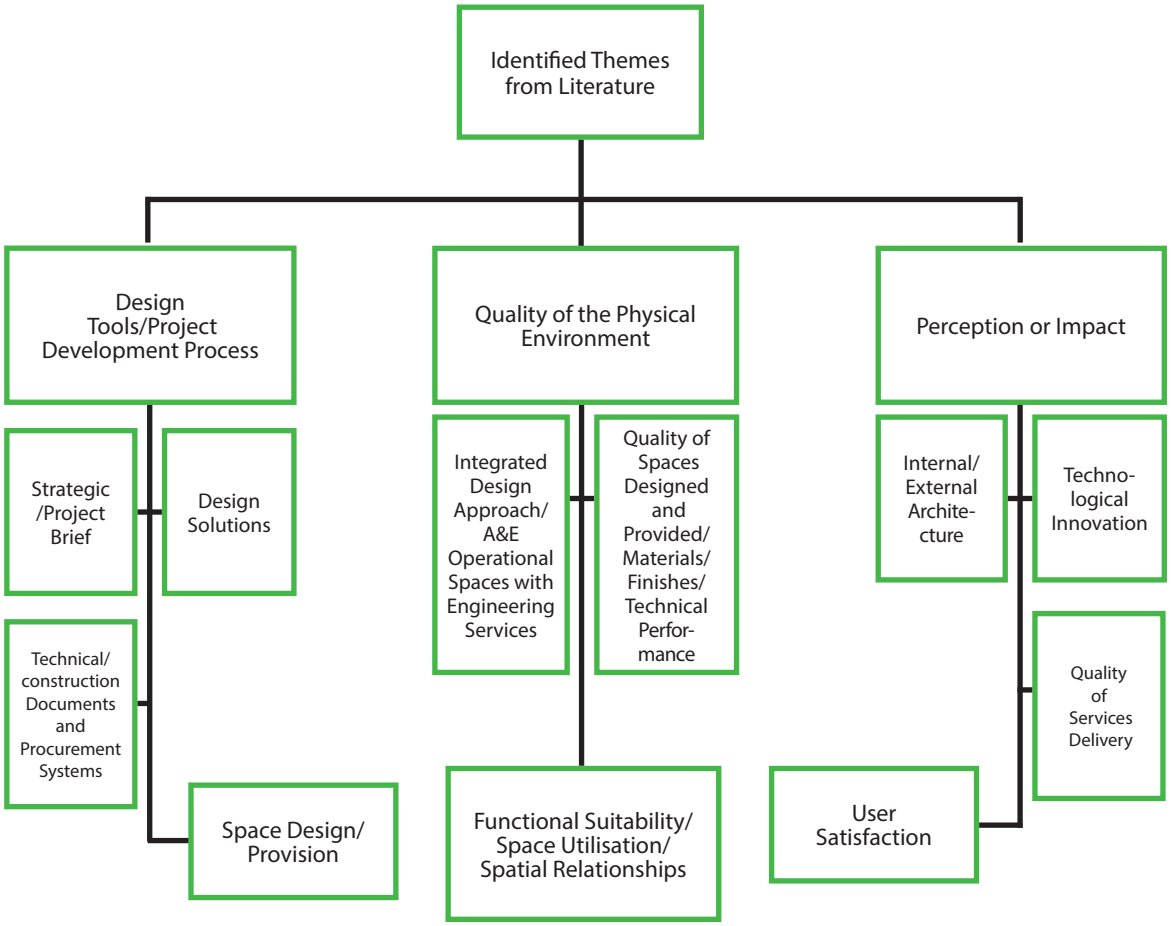

Figure 1.5: Emerging themes from the literature review

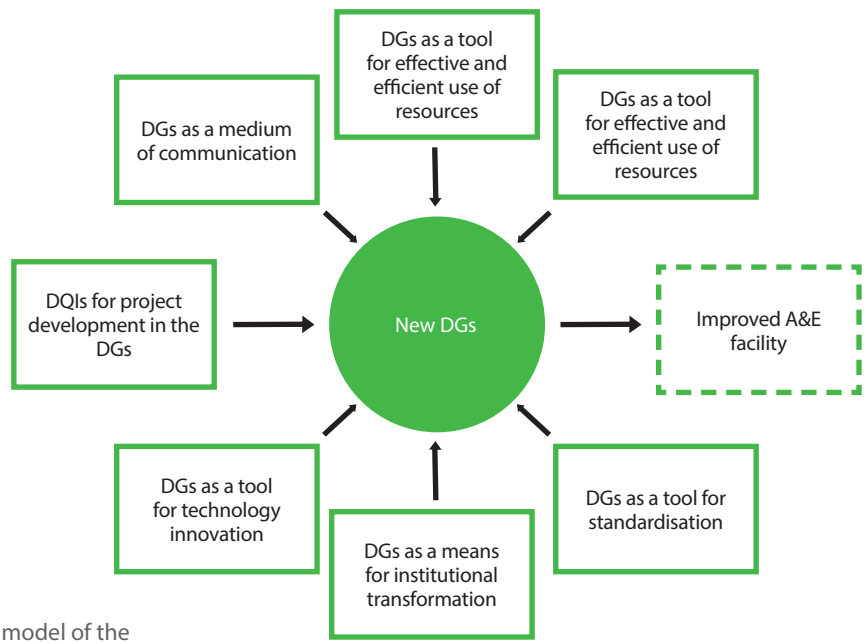

Figure 1.6: Proposed model of the conceptual framework for DGAEF update

RESEARCH FINDINGS

Findings associated with the first primary reasearch question: Are DGAEF followed? The importance of communication, awareness, use of guidelines and comlicance to the DGAEF:

The findings of the questionnaire and interview surveys illustrated in Figure 1.9 reveal major differences in levels of awareness, use and compliance amongst consultants and government officials. The challenges faced by the project team in the design and project development process for CHBHSJ and KHCT A&E facilities suggest that there are inadequate communication, continuous feedback and evaluation tools for analysing project briefing, design solutions, technical documentation, procurement, construction, commissioning, operation and maintenance, and project costs. The findings suggest the need for improved communication; translation; feedback; evaluation and educational tools to improve awareness, use of and compliance to the DGAEF.

The effect of DGAEF on efficient and effective use of resources

The findings of the questionnaires, interviews, floor plan analysis and observational studies on the concepts of integration; distribution; equity; attachment and value for money illustrated in Figure 1.10 below reveal that the information systems in the DGAEF can improve the effectiveness and efficiency of the A&E facility project development process. Information systems and data on the socio-political and economic context in the DGs influences choice of the design solution, materials, finishes and construction systems.

Project development process, programme, and budget: The case study of CHBHSJ A&E facility reveals that the innovative project development approach adopted was successful as illustrated in Figure 11. However, on the whole, project programmes for completion of healthcare facilities projects are excessively long. The two major effects of these delays are:

(i) under expenditure of healthcare facilities budgets; and

(ii) poor provision of A&E facilities and over expenditure when they are completed.

Hence the urgent need to update the project management tools in the DGAEF in order to expedite the project development timeframe.

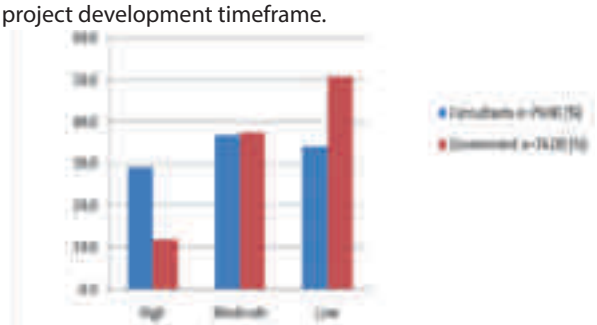

Figure 1.9: DGAEF and efficient and level of compliance amongst consultants and government

Findings associated with the second primary reasearch question: How effective and efficient is healthcare services delivery from A&E facilities? Influence of DGAEF in achieving healthcare facilities development goals through participatory process

The findings of the questionnaire and interview surveys, floor plan analysis and observational studies at CHBHSJ and KHCT A&E facilities shown in Figure 1.11 revealed that the participation of users during the pre-design stage through broad based consultation can stimulate positive attitude and behaviour of the users. This can help create a sense of knowledge, identity, obligation, influence, involvement, ownership and attachment to the healthcare facility. Findings from the interviews affirmed that participation of users can provide invaluable insights into various aspects of the briefing and design processes that can help preclude late frequent design changes and consequent increases in overall project costs, as in the case of the CHBHSJ and KHCT A&E facilities as in. Indeed, the literature review findings also revealed that users want to be involved and identified in decision making regarding the design of their healthcare facilities.

The findings at both CHBHSJ and KHCT A&E facilities suggest that only few caregivers are consulted during space narrative and programming for healthcare facilities and also during project development process for public healthcare facilities in South Africa.

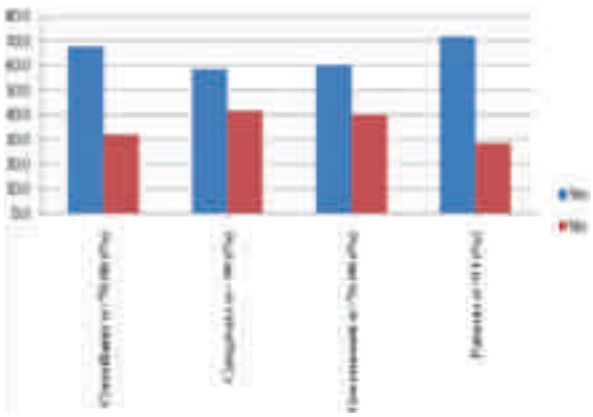

Figure 1.10: DGAEF and its influence on efficient and effective use of resources

The influence of DGAEF on technology innovation

The, findings of the floor plan analysis at KHCT A&E facility illustrated in Figure 1.8 and Figure 1.12 reveal that the space design and provision do not support continuity of medical attention and transferability of patients into alternative rooms. Thus, medical attention to patients cannot be administered in specific room categories. In contrast, the DGs used for space design and provision in the CHBHSJ A&E facility where multiple use spaces are introduced through technology innovation. The findings from CHBHSJ A&E facility also revealed that it is essential for the design team to obtain comparative information through the use of technology for estimating workload prediction, desired operational systems and engineering services required in

Khayelisha Hospital Main Lobby

each A&E space.

This will enable the provision of integrated and flexible/ adaptable spaces necessary for improved operational process. The floor plan analysis, observational studies and Space Syntax techniques revealed that technology innovation can be used as a tool for evaluating design information such as workload predictions, computer modelling, mock-ups and walk-through simulation.

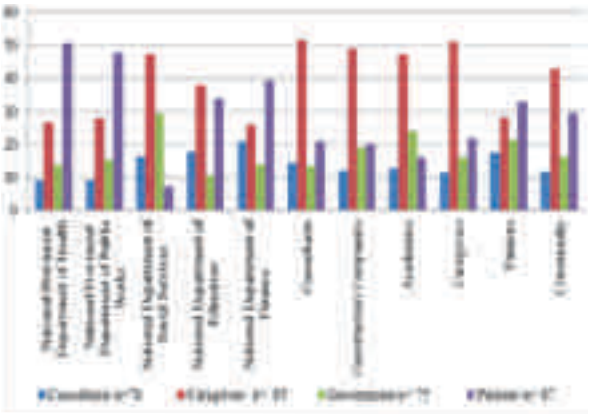

Figure 1.11: Key stakeholders to participate in DGAEF update and project development process

Furthermore, using technology during the design process reduces the risks associated with consultants and clients not understanding the proposed design solutions for the project. The findings from the investigation of the two case study A&E facilities suggest that introducing information systems for technology innovation in the DGAEF can positively influence the effectiveness and efficiency of healthcare services delivery.

Findings accosiated with the third primary research question: What are the contributions of buildnings towards efficient A&R operations? Effect of appropriate DGAEF on healthcare institutional organisational culture

The findings from the questionnaire and interview surveys, floor plan analysis and observational studies revealed that significant healthcare institutional change often requires accompanying DGAEF update for improved healthcare facilities services delivery. There is an interdependent relationship between DGAEF and space design and provision, functional suitability, spatial relationship and healthcare institutional culture, and the efficiency and effectiveness of A&E facility operation.

The questionnaires findings from CHBHSJ and KHCT A&E facilities shown in Figure 1.13 revealed that DGs can significantly influence an effective and efficient A&E healthcare facility design process, and which may take into account the tasks and systems involved in producing the work in the healthcare institution or a sub-unit of an organization. A&E healthcare facility project development process may have to focus on the way things are: as an organization pauses to consider how to make things better in order to improve on these issues: management; quality of services; procurement systems.

Figure 1.8: Khayelisha Hospital A&E Treatment Area with Curtains for Privacy

The findings from interview at CHBHSJ A&E facility revealed also that the appointment of a construction management firm to act as single entity responsible for the project was relatively successful. This innovative procurement system eliminates long bidding procedures required in the traditional procurement method, in which design is separated from construction activity. The benefits of using this procurement system include improved project brief, design, construction programme management and overall project coordination amongst the consultants, the construction firm and the healthcare institution.

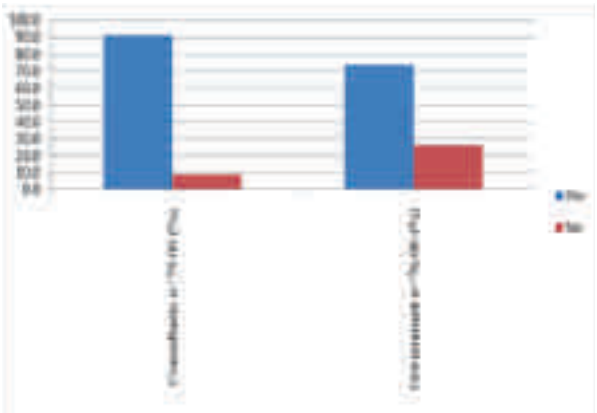

Figure 1.12: DGAEF and its effect on technology innovation during project development process

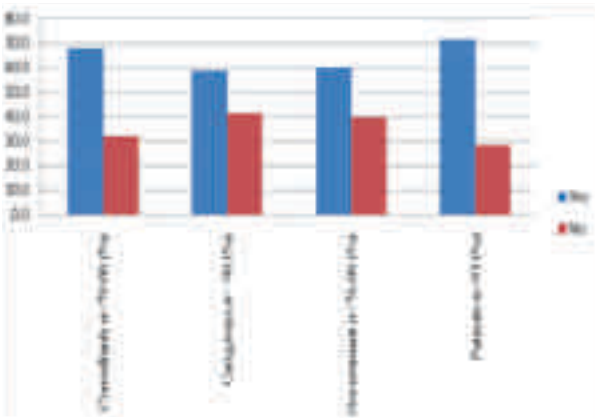

Figure 1.13: DGAEF influence on space design and provision for efficient and effective A&E healthcare services delivery

Furthermore, this finding revealed that continuous involvement of the healthcare institution during project development process influences efficiency and effectiveness of the A&E operations and positive outcomes of the capacity efficiency.

Although, the integrated project development process used at CHBHSJ A&E was successful, it also highlighted some risks associated with this procurement approach related to: construction guarantees and management of defects liability periods for completed works. This study suggests that alternative procurement approaches, which are gaining in popularity in various forms, in particular for public sector projects, in both developed and developing countries, may be considered in the DGAEF update. For example, the Private Finance Initiative (PFI) approach has been used successfully in UK, by providing guidance for the use of interdisciplinary project team for healthcare facilities projects.

Standardisation of the project development of process and life-cycle costing

The findings of the questionnaires at CHBHSJ and KHCT A&E facilities on standardisation of project development process illustrated in Figure 1.14 revealed as follows: 97.7% of the caregivers favour the introduction of standard project development tools in the DGAEF update; in contrast, 97.5% of the consultants and 88.1% government officials were not in favour. The findings on the need to introduce benchmarking tools in the DGAEF for evaluating project life-cycle costs show that 78.5% of the consultants and 86.3% of the government officials respectively felt that there is need for it, to ensure long term sustainability of healthcare services delivery.

The respondents also indicated that it can be a solution for long-term sustainability of A&E facilities, in particular with respect to: quality of the finished product; time; cost and healthcare services delivery. For example, standardisation is capable of generating simple project development systems to ensure replicable good practice in design, construction and operations. Additionally, standardisation can facilitate repetitive, flexible and adaptive systems and, hence, pre-assembly and good aesthetic standards for healthcare facility design based on tested and agreed frameworks. And this strategy can influence the introduction of flexible and adaptable project development tools. Moreover, the introduction of information systems for standard building systems in the DGAEF can improve project budget prediction, and it will simplify budgeting issues.

The findings of observational studies and Space Syntax techniques at CHBHSJ A&E KHCT A&E facilities point to the need to introduce generic standardised project development tools to improve the outcomes obtained using these concepts: repetition, pre-assembly, aesthetics and satisfaction for project development process. The findings also revealed that standard project development protocols can provide solutions for aesthetics durability, serviceability and, satisfaction of the healthcare facility environment, which relates directly to the quality of the interior space design and provision, functional suitability and spatial relationship (choice of the finishes, materials and colours).

CONCLUSION

This study reveals that to ensure that good results are achieved in healthcare facility project development, benchmarking tools in the DGAEF for design and operational systems-based perspectives should be used to coordinate planning between the operational system, the design and sub-project team members, and the construction firm. Currently, as shown in this study, the majority of design decisions are made expeditiously based on previous experience with similar situations, familiar materials and known technologies.

However, evidence applied to one situation may produce entirely different suggestion in another context. Hence, the KPIs in the DGs used for space design and provision should be specific to a particular context. Therefore, the data used for space programming should relate to the geographical, political, economic, social and cultural circumstances of the context where the healthcare facility is situated. This study tells us that we need to carefully examine our decision making through the information and knowledge systems in the DGAEF using the full power of both our rational and emotional capabilities. For example, community healthcare

facility may have limited human and other resources to meet the minimum area requirements for patient rooms as recommended in DGs for healthcare facilities, which might be necessary at a city healthcare facility. In practice we have seen in this study that the A&E patient room's space design should be flexible and adaptable in order to accommodate evolving need. But the general and specific requirements in the DGAEF have yet to be changed.

In conclusion, it is revealed in this study that access to information and knowledge systems and awareness of the importance of DGAEF by the design professionals can improve A&E facilities design and poor results obtained in the KPIs used for measuring the healthcare systems of equity, efficiency, effectiveness and responsiveness.

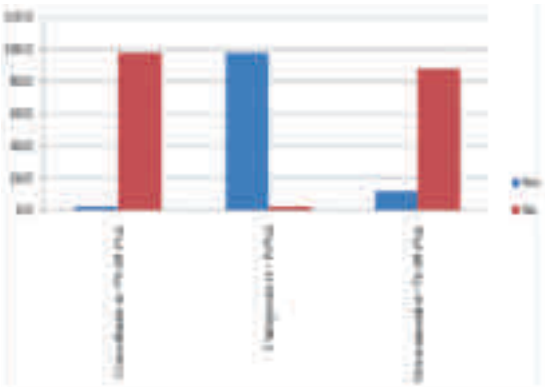

Figure 1.14: DGAEF and its impact on standardisation of project development process and operations

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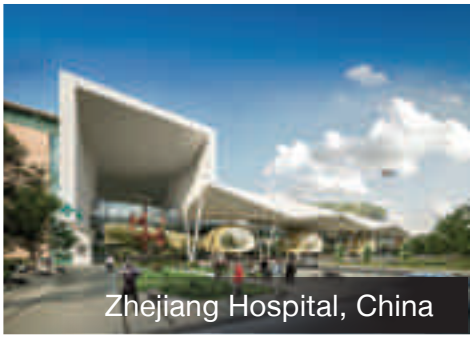
Dr. Innocent Okpanum

Ngonyama Okpanum Associates , South Africa

Dr Innocent Okpanum is an architect, researcher, urban designer, healthcare design specialist and the managing director and owner of the architectural firm, Ngonyama Okpanum & Associates; which has offices in eight cities in South Africa and in Abuja, Nigeria. He studied in Genoa, Italy where he obtained a doctorate degree in architecture.He also holds a PhD in architecture from the University of Newcastle in the United Kingdom. He is a member of the architectural institutes of Italy and South Africa. Innocent has undertaken numerous studies and researches in healthcare design with a particular emphasis on hospital emergency departments and the development of design guidelines and design quality standards for healthcare facilities. He has gained extensive professional experience spanning over 27 years of practice in Europe and Africa; and has designed a wide range of hospitals and related healthcare facilities in Italy, South Africa and Nigeria.

Lady Cilento Children's Hospital, Brisbane
Conrad Gargett Lyons

St Stephen's Hospital, Hervey Bay



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